This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE
MEDICAL LIBRARY
SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
SEMPER VIRENS
1885
LEVI COOPER LANE FUND

PRESENTED TO
The New York Academy of Medicine.
By
The Society of the New York Hospital,
March, 1898.

PRESENTED
BY
J. BOORMAN JOHNSTON.

LANE
MEDICAL LIBRARY
SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
1885
LEVI COOPER LANE FUND

PRESENTED TO
The New York Academy of Medicine.
By
The Society of the New York Hospital,
March, 1898.

PRESENTED
BY
J. [redacted] STON.

In Preparation

BY THE AUTHOR OF THIS VOLUME:

DEFECTS OF VOICE AND SPEECH:

PRECEDED BY A PHYSICO-PHYSIOLOGICAL ESSAY ON

THE FORMATION OF THE VOICE; AND THE MECHANISM OF SPEECH.

ILLUSTRATED.

DISEASES OF THE THROAT:

A GUIDE TO THE DIAGNOSIS AND TREATMENT OF AFFECTIONS OF THE PHARYNX, ŒSOPHAGUS, TRACHEA, LARYNX, AND NARES.

By J. SOLIS COHEN, M.D.,

LECTURER ON LARYNGOSCOPY AND DISEASES OF THE THROAT AND CHEST, IN
JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

MÜTTER LECTURER BEFORE THE COLLEGE OF PHYSICIANS, PHILADELPHIA; PERMANENT
MEMBER OF THE AMERICAN MEDICAL ASSOCIATION; AND OF THE MEDICAL
SOCIETY OF THE STATE OF PENNSYLVANIA. FELLOW OF THE COLLEGE OF PHYSICIANS, PHILADELPHIA; ACTIVE, HONORARY,
AND CORRESPONDING MEMBER OF VARIOUS MEDICAL, SCIENTIFIC, AND LITERARY SOCIETIES;

LATE ACTING ASSISTANT-SURGEON IN THE NAVY OF THE UNITED STATES, ETC., ETC.,

WITH 133 *ILLUSTRATIONS ON* *WOO*

LANE MEDICAL LIBRARY
11689
SAN FRANCISCO

NEW YORK:
WILLIAM WOOD & COMPANY.
1872.

EM

Entered according to Act of Congress, in the year 1872,
By WILLIAM WOOD & CO.,
In the Office of the Librarian of Congress, at Washington, D. C.

Poole & Maclauchlan, Printers,
205–213 *East Twelfth St.*
New York.

R46
C67
1872

To

LOUIS ELSBERG, M.D.,

Clinical Professor of Diseases of the Throat in the University of New York;
and the most accomplished Laryngoscopist in America:

MY SCHOOLMATE IN BOYHOOD, MY FELLOW-STUDENT IN MEDICINE,
MY CO-LABORER AND OFTEN MY GUIDE
IN
THOSE DEPARTMENTS OF PROFESSIONAL AND GENERAL SCIENCE TO WHICH
WE ARE BOTH DEVOTED,
AND EVER MY GENEROUS AND WARM-HEARTED FRIEND:

This Work is Affectionately Inscribed,

IN RECOGNITION OF HIS PROFESSIONAL TALENTS; HIS SCHOLASTIC ACQUIREMENTS; HIS SOCIAL VIRTUES; AND HIS MANLINESS.

The Author.

PREFACE.

THE preparation of the following pages has been no holiday task on the part of the author. Only such irregular intervals as could be snatched from the requirements of an unusually arduous practice could be devoted to the purpose. Hence there has ensued an inequality in composition of which the writer is sensibly cognizant. Some subjects have had to be discussed in a manner rather different from that originally contemplated, and the context of numerous references, toilsomely collected for their elucidation, has remained unincorporated.

With the exception of a few hospital and dispensary patients, seen from time to time at the request of his professional friends, the author's entire experience has been confined to his own private and consultation practice. This has debarred him from much opportunity for personal pathological research; but it has facilitated the description of morbid processes as they are met with in the ordinary routine of practice, a matter of no slight recommendation to the general professional reader, and one which it is hoped will compensate, at least in part, for deficiencies in other directions.

The limits of a moderate-sized volume preclude the composition of an exhaustive treatise on the subject of Diseases of the Throat. It has been thought advisable, therefore, while presenting a comprehensive view of the entire field, to dwell longer upon subjects which are important by their frequency and by the fresh light shed upon them by recent investigation; and to treat concisely of those points which by their infrequency on the one hand, or their thorough discussion in the standard medical works of the day on the other, seem less to call for amplification.

It is impossible to furnish an explicit and perfect description of a disease so as to afford a complete and satisfactory mental picture of the condition of every example of it which may come under notice. Each case exhibits some special phenomena of severity or of mildness; or is different in some other particular from every other case with the same general aspect. All that a writer can do is to mention the characteristics which determine the nature of the diseased action going on, to designate the elements of danger and of safety, and to indicate the methods of management which reason and experience have proven to be most adequate for relief, or best productive of cure. In attempting this, much has to be said which others have said already, and often in better language; but this repetition is sometimes necessary to complete the outline of a subject, or to convey intelligence for the first time to those who have not had access to original sources of information.

Due consideration has been given, in the subject matter of the volume, to modern developments in the diagnosis and treatment of affections of the throat, especially those occupying the trachea, larynx, upper pharynx, and nasal passages. Here the author's experience has been ample; and if his record differs in some respects from the records of others, it does so by reason of an honest endeavor to interpret facts and observations as they appeared in the light of his own understanding. The articles on laryngoscopy, rhinoscopy, and surgical manipulations by their aid, are, with some additions, modifications, and omissions, essentially reprints of those contributed by the author, a few years ago, to the columns of THE MEDICAL RECORD, of New York, and to the second American edition of MACKENZIE on the USE OF THE LARYNGOSCOPE.

The author has availed himself of the labors of his predecessors and contemporaries, in the production of this volume, as freely as he has resorted to them for his own instruction. He has endeavored, except in so far as certain general matters have long become the common property of the profession, to give due credit to his sources of information.

For the use of the studious and the curious, he has appended a bibliographical record, culled from his own index-rerum; and this has been distributed under catch-heads, as being more convenient for consultation than a purely alphabetical list of authors, or a mere chronological arrangement.

Acknowledgment is made to Mr. G. H. Gemrig, of Philadelphia, for many illustrations of surgical instruments; and also to Messrs. Otto & Reynders, and to Messrs. Tiemann & Co., of New York, for like favors. All the original woodcuts in the volume, and many of the copied ones, were engraved by Mr. Sebald, of Philadelphia.

1327 GREEN STREET, PHILADELPHIA, May, 1872.

TABLE OF CONTENTS.

CHAPTER I.

PAGE
DISEASES OF THE THROAT IN GENERAL.............. 1

CHAPTER II.

EXAMINATION OF THE THROAT.

ORDINARY INSPECTION.—LARYNGOSCOPY.—AUTO-LARYNGOSCOPY.—DEMONSTRO-LARYNGOSCOPY.—INFRA-GLOTTIC LARYNGOSCOPY.—ŒSOPHAGOSCOPY.—REGIONAL ANATOMY OF THE LARYNX.—EXAMINATION OF THE LARYNGEAL IMAGE IN DETAIL.—THE MUSCULAR FORCES PRODUCING CHANGES IN THE FORM OF THE GLOTTIS.—MUCOUS MEMBRANE, GLANDS, BLOOD-VESSELS, AND NERVES OF THE LARYNX.—HISTOLOGY OF THE LARYNX.—RHINOSCOPY............. 6

CHAPTER III.

SORE THROAT.

ERYTHEMATOUS SORE-THROAT.—PHLEGMONOUS SORE-THROAT.—ULCERATED SORE-THROAT.—MEMBRANOUS SORE-THROAT. 78

CHAPTER IV.

DIPHTHERIA... 97

CHAPTER V.

THE SORE-THROATS OF THE EXANTHEMATA.

THE SORE-THROAT OF SMALL-POX.—THE SORE-THROAT OF MEASLES.—THE SORE-THROAT OF SCARLATINA.—ERYSIPELATOUS SORE-THROAT.............................. 104

CHAPTER VI.

SYPHILITIC SORE-THROAT.

PAGE
Syphilitic Sore-throat of adults.—Syphilitic Sore-thoat of infants 113

CHAPTER VII.

SORE-THROAT FROM BURNS AND SCALDS 123

CHAPTER VIII.

SPECIAL AFFECTIONS OF THE TONSILS.

Foreign bodies.—Calcareous concretions.—Cancerous tumors.—Cystic tumors.—Permanent enlargement of the tonsils 125

CHAPTER IX.

SPECIAL AFFECTIONS OF THE PALATE AND UVULA.

The pharyngo-palatine muscles.—Tumors of the palate.—Cleft-palate.—Paralysis of the palate.—Chronic elongation of the uvula.—Œdema of the uvula.—Excrescences on the uvula.—Bifid uvula 133

CHAPTER X.

SPECIAL AFFECTIONS OF THE PHARYNX.

Abscess of the pharynx.—Chronic follicular pharyngitis.—Glandular hypertrophy at the vault of the pharynx.—Tumors of the pharynx.—Pharyngocele.—Naso-pharyngeal tumors.—Wounds of the pharynx 148

CHAPTER XI.

SPECIAL AFFECTIONS OF THE ŒSOPHAGUS.

Œsophagitis.—Congenital occlusion of the œsophagus.—Congenital fistule of the œsophagus.—Stricture

PAGE

OF THE ŒSOPHAGUS.—SPASM OF THE ŒSOPHAGUS.—DILATATION OF THE ŒSOPHAGUS.—GLOSSO-PHARYNGEAL PARALYSIS.—TUMORS IN THE ŒSOPHAGUS.—WOUNDS OF THE ŒSOPHAGUS.—FOREIGN BODIES IN THE ŒSOPHAGUS.—FANCIED BODIES IN THE PHARYNX AND ŒSOPHAGUS.—ŒSOPHAGOTOMY.................................... 212

CHAPTER XII.

AFFECTIONS OF THE NASAL PASSAGES.

THE NASAL MUCOUS MEMBRANE.—EPISTAXIS.—NASAL ABSCESS.—CORYZA.—IDIOSYNCRATIC CORYZA.—INFLUENZA.—CHRONIC CORYZA.—OZÆNA.—THE NASAL DOUCHE.—ANOSMIA.—SYPHILITIC AFFECTIONS OF THE NASAL PASSAGES.—PARALYSIS OF THE NOSTRILS.—OCCLUSION OF THE NOSTRILS.—CONGENITAL OCCLUSION OF THE POSTERIOR NARES.—INFLAMMATION OF THE NASAL SEPTUM.—SUBMUCOUS INFILTRATION AT THE SIDES OF THE VOMER.—TUMORS OF THE SEPTUM.—DEVIATIONS OF THE SEPTUM FROM THE MIDDLE LINE.—FOREIGN BODIES IN THE NOSTRILS.—CALCAREOUS ACCRETIONS IN THE NASAL FOSSÆ.—TUMORS IN THE NASAL PASSAGES. — TAMPONING THE POST-NASAL FOSSÆ.. 243

CHAPTER XIII.

AFFECTIONS OF THE FRONTAL SINUS.

INFLAMMATION.—ABSCESS.—TUMORS......................... 325

CHAPTER XIV.

AFFECTIONS OF THE LARYNX AND TRACHEA.

ACUTE LARYNGITIS.—ŒDEMA OF THE LARYNX.—CHRONIC LARYNGITIS.—THE CHRONIC LARYNGITIS OF PHTHISIS.—THE CHRONIC LARYNGITIS OF SYPHILIS. — MANIPULATIONS WITHIN THE LARYNX.—ELEPHANTIASIS OF THE LARYNX.—INFLAMMATIONS OF THE TRACHEA.—CONSTRICTION OF THE TRACHEA.—FISTULE OF THE LARYNX AND TRACHEA.

PAGE

—CROUP.—GROWTHS IN THE LARYNX.—TUMORS OF THE TRACHEA.—FOREIGN BODIES IN THE LARYNX AND TRACHEA.—APHONIA.—LARYNGISMUS STRIDULUS.—SPASMODIC COUGH.—WHOOPING-COUGH.—WOUNDS OF THE LARYNX AND TRACHEA.—FRACTURES OF THE LARYNX.—FRACTURES OF THE TRACHEA.—RUPTURE OF THE TRACHEA.—CONTUSIONS OF THE LARYNX AND TRACHEA.—ARTIFICIAL OPENINGS INTO THE LARYNX AND TRACHEA.—CATHETERIZATION OF THE LARYNX AND TRACHEA.—AFFECTIONS OF THE LARYNGO-PHARYNGEAL SINUS......... 333

CHAPTER XV.

DISEASES OF THE NECK AFFECTING THE DEEPER TISSUES OF THE THROAT SECONDARILY.

DIFFUSE INFLAMMATION OF THE CONNECTIVE TISSUES OF THE NECK.—TUMORS OF THE NECK.—MUMPS.—BURSAL TUMORS OF THE THYRO-HYOID REGION.—AFFECTIONS OF THE THYROID GLAND.—AFFECTIONS OF THE THYMUS GLAND..... 507

REFERENCES ON SUBJECTS TREATED OF IN THE TEXT.. 533

INDEX.. 573

LIST OF ILLUSTRATIONS.

FIG. PAGE

1. Tongue-depressors 7
2. Tobold's tongue-depressor.. 8
3. Türck's tongue-depressor..... 8
4. Hard-rubber tongue-depressor 9
5. Laryngoscopic mirror of circular form 13
6. Side and front views of laryngoscopic mirrors of different forms and sizes (Tobold).................... 14
7. The laryngoscopic mirror in position........................ 17
8. Manner of holding laryngoscopic mirror previous to its introduction...................... 18
9. Relative relations of larynx and its image in the laryngoscopic mirror.. 19
10. Von Brun's pincette for holding up the epiglottis............. 26
11. Examination by reflected light, with reflector on forehead (from Bennet).. 29
12. Tobold's apparatus for artificial illumination (Tobold)......... 31
13. Tobold's apparatus for illumination, with stand (Tobold)...... 33
14. Tobold's illuminating apparatus, fed with gas, supported from floor, with arm of reflector above the lenses; the whole movable up or down, right or left, by means of a supporting rod, sliding in the socket of the stand.................... 34
15. Examination of the larynx by means of Tobold's pocket illuminator (Tobold) 35
16. Czermak's auto-laryngoscopic apparatus (Czermak)........... 38
17. Tobold's perforated canula, and small metallic mirror for infraglottic laryngoscopy 44
18. Normal larynx during inspiration.......................... 54
19. Laryngoscopic drawing, showing the vocal cords drawn widely apart, and the position of the various parts above and below the glottis, during quiet inspiration (Mackenzie)........... 58
20. Laryngoscopic drawing, showing the approximation of the vocal cords, and the position of the various parts in the act of vocalization (Mackenzie) 58
21. Rhinoscopic image.. 72
22. Rhinoscopic image in a case of cleft palate.................. 73
23. Case of cleft palate affording image of Fig. 22............... 73
24. Rhinoscopic view of left Eustachian orifice.................. 74
25. Elsberg's nostril dilator and speculum 76
26. Thudichum's dilating speculum for the nostrils.... 76

FIG. PAGE
27. Syphilitic ravages in the soft palate, tonsil, and lateral pharyngeal wall ... 117
28. Syphilitic ravages in epiglottis, and lateral laryngeal wall, in same case as Fig. 27 ... 117
29. Fahnestock's tonsillotome ... 129
30. Physick's tonsillotome ... 129
31. Charrière's tonsillotome ... 130
32. Anterior view of the musculature of the pharynx and palate, after removal of tongue, hyoid bone, and larynx, as far as the posterior segment of its thyroid cartilage (Luschka) ... 136
33. Mouth-distender for facilitating the operation for cleft palate, and other operations within the mouth (Whitehead) ... 142
34. Mouth-distender in position for the operation of cleft palate (Whitehead) ... 142
35. Follicular pharyngitis ... 161
36. Chronic follicular pharyngitis ... 163
37. Adenoid tissue of vault of pharynx (Luschka) ... 178
38. Pharyngeal bursa (Luschka) ... 181
39. View of glandular tissue at vault of pharynx, in a case of cleft palate ... 185
40. View of Eustachian orifice in a case of cleft palate ... 186
41. Rhinoscopic view of glandular vegetations at vault of pharynx. 190
42. Rhinoscopic view of a case of glandular hypertrophy at vault of pharynx ... 193
43. Œsophageal dilators for stricture ... 219
44. Enormous dilatation of œsophagus (Luschka) ... 223
45. Bond's œsophageal forceps ... 235
46. Burge's œsophageal forceps ... 235
47. Horsehair snare and probang for the removal of foreign bodies from the œsophagus ... 236
48. Canula of Bellocq for plugging posterior nares ... 250
49. Buttle's nasal inhaler ... 258
50. Lewin's arrangement for generating nascent muriate of ammonia ... 276
51. Thudichum's nasal douche (Thudichum) ... 279
52. Nasal douche ... 287
53. Thudichum's syphon nasal douche ... 287
54. Syphon douche with compression-bulb ... 288
55. Manner of arranging syphon nasal douche ... 288
56. Rhinoscopic image of œdema of nasal septum ... 299
57. Rhinoscopic image of œdema of nasal septum ... 299
58. Submucous infiltration of posterior nasal septum supposed to be due to mycelium ... 299

FIG. PAGE
59. Gross' instruments for removal of foreign bodies from the nose.. 304
60. Gelatinoid nasal polyp (Liston) 308
61. Polypus forceps 312
62. Buck's knife for scarifying an œdematous larynx 343
63. Laryngoscopic appearance of œdema of larynx with ulceration, in the latter stage of phthisis 361
64. Mounted skull for preliminary practice in the operative procedures of intra-laryngeal surgery (Tobold) 381
65. Laryngeal brush and sponge-holder 386
66. Türck's laryngeal brush 387
67. Tobold's laryngeal syringe 387
68. Gibb's laryngeal douche 387
69. Newman's spray-producer 388
70. Rauchfuss' laryngeal powder-insufflator 389
71. Tumors on both vocal cords, producing sudden death 409
72. Tumor on left vocal cord, producing sudden death 409
73. Tobold's sponge-holder (Tobold) 421
74. Sponge-holder 421
75. Elsberg's sponge-holder 422
76. Tobold's forceps for nitrate of silver in stick (Tobold) 422
77. Tobold's roughened probe for the use of molten nitrate of silver (Tobold) 422
78. Tobold's concealed holder for molten nitrate of silver, or for chromic acid (Tobold) 423
79. Excrescence on left vocal cord 424
80. Excrescence on right vocal cord 424
81. Epithelial growths on both vocal cords, in a case of phthisis 425
82. Appearance of cords after destruction of growths with chromic acid 425
83. Tobold's laryngeal forceps (Tobold) 428
84. Fauvel's laryngeal forceps 428
85. Cuzco's laryngeal forceps 429
86. Mackenzie's laryngeal forceps (Mackenzie) 430
87. Tobold's concealed pincette (Tobold) 431
88. Mackenzie's laryngeal tube-forceps and scissors (Mackenzie) 432
89. Papillary growths in phthisis, removed with forceps 433
90. Papilloma occupying posterior laryngeal wall, and removed by evulsion 433
91. Pedunculated polyp on vocal cord, in a case of phthisis 433
92. Pedunculated fibroid polyp beneath vocal cords, and removed with Fauvel's forceps 433
93. Laryngeal growths removed by evulsion and caustics 434
94. Same case as Fig. 93, after removal of growths 434

FIG. PAGE
95. Tobold's concealed knife (Tobold) 436
96. Tobold's lancet-pointed probe (Tobold) 436
97. Tobold's knife, with double cutting edge (Tobold) 437
98. Tobold's knife, with single cutting edge (Tobold) 437
99. Tobold's perpendicularly cutting scissors (Tobold) 438
100. Tobold's horizontally cutting scissors (Tobold) 438
101. Gibb's wire-snare for larynx (Gibb) 439
102. Tobold's wire-snare for laryngeal growths (Tobold) 439
103. Guarded wheel ecraseur (Mackenzie) 441
104. Tobold's chain-ecraseur (Tobold) 441
105. Voltolini's laryngeal galvano-cautery 442
106. A simple form of galvano-cautery for the larynx 442
107–112. Burners and cutting loops for galvano-cautery (Bruns) 443
113. Pimple on the epiglottis, removed by galvano-cautery 444
114. Fibrous tumor on right vocal cord, removed after thyrotomy, without tracheotomy 445
115. Laryngeal growths, for the removal of which thyrotomy was performed after tracheotomy 446
116. Appearance of the parts some months after operation 446
117. Appearance of the parts some years after the operation 446
118. Dr. Schrötter's case of tumor of the trachea (Schrötter) 452
119. Paralysis of left vocal cord in a case of phthisis. Appearance during respiration 465
120. Paralysis of left vocal cord in a case of phthisis. Appearance during attempt at phonation 465
121. Paralysis of left vocal cord in a case of aneurism of the aorta. Appearance during respiration 466
122. Paralysis of left vocal cord in a case of aneurism of the aorta. Appearance during attempted phonation 466
123. Aphonia, with momentary normal closure of glottis. Also represents aphonia with normal closure, but want of vibration of one or both cords (Tobold) 467
124. Complete paralysis of both cords (Tobold) 467
125. Paralysis of thyro-arytenoid muscles. Closure of the inter-arytenoidal space of the glottis, that portion between the vocal cords remaining open (Tobold) 467
126. Elliptical opening of entire glottis (Tobold) 468
127. Want of approximation of the arytenoid cartilages 468
128. Mackenzie's laryngeal electrodes 471
129. Trousseau's double tracheotomy tube 498
130, 131. Howard's extemporaneous tracheotomy tube (Howard) 499
132. Trousseau's dilator for use in tracheotomy 503
133. Hewson's torsion forceps 511

DISEASES OF THE THROAT.

CHAPTER I.

DISEASES OF THE THROAT IN GENERAL.

THE diseases of the throat met with in the practice of medicine do not differ materially from the diseases encountered in other regions of the body. Inflammation occurs in its various grades; and this may be idiopathic or traumatic; or it may exist as an integral element, or as a result, of systemic affections, such as tubercle, syphilis, scrofula, cancer, rheumatism, gout, erysipelas and the exanthemata, albuminuria, aneurism, the chronic affections of the skin, etc.

Then we have the products of inflammation, glandular swellings, tumors benign and malignant, strictures, etc.; and, finally, we encounter various nervous affections of the throat.

The mucous membrane of the throat is exceedingly prone to disease, partly from its exposed condition, partly from a peculiar proclivity, the nature of which is but imperfectly understood, and partly from extension of disease existing in adjacent parts, not infrequently the skin, with the affections of which it has much in common, in consequence of analogy of construction.

The treatment of diseases of the throat is rendered more protracted than the treatment of diseases in most other portions of the body, on account of the difficulty of protecting the affected structures from the contact of the air, and the impracticability of keeping up local applications with any degree of continuousness; a circumstance which compels a course of management differing from that which would be employed in similar affections occurring elsewhere, where we avail ourselves of the plaster and the compress, with or without resort to the use of remedial agents.

In almost all diseases of the throat, the secretion from the mucous membrane is affected. Sometimes it is simply diminished in quantity, sometimes it is simply increased in quantity; but most frequently it is altered in quality as well as in quantity.

The normal secretion of the mucous membrane is seen to be a transparent watery exhalation, equably diffused over the surface, and giving little or no refractive evidence of its existence. It serves to keep the parts moist, pliable, and in a state of comfort; and it protects them from the irritating influence of external matters, whether present in the air, or brought in contact under special circumstances of employment or exposure.

The most common effect of simple irritation of the mucous membrane is the collection of this exhalation into drops, which present, according to the direction of light under which they are examined, the appearance of minute vesicles or granules; and although this is not an evidence of active or serious disease, throats exhibiting this appearance are often called granular, not in the mere sense of description, but with the idea that the mucous membrane is deprived of its epithelial coat, and that the globules or granules are the prominences of enlarged follicles or muciparous glands—a condition which sometimes exists under circumstances to be mentioned in the sequel. Under this misapprehension many an unoffending throat has been unhesitatingly cauterized and re-cauterized, and therefore heedlessly subjected to the chance of sustaining permanent injury; a result, however, which fortunately does not always follow in this class of affections, inasmuch as reparation is prompt, owing to the good state of the general health, and the innocuousness of the agent most frequently applied upon the healthy mucous membrane. Sometimes, indeed, it must be acknowledged that such treatment, if not repeated frequently, as is too often the case, seems to rouse up the latent vascular action of the part, and conduce to prompt resumption of function.

The researches of physiologists teach us that healthy mucous membrane does not secrete mucus, properly so called.

When mucous membrane is diseased, the new nuclei, which would otherwise have been formed into epithelial cells, take on the active cell-growth of a lowered organization, and adhere to each other in masses which, with the fluids in which they are held, are known to us as mucus. This increased cell-action is very great, often producing material in much greater abundance than could be furnished by the extent of mucous surface involved, were the entire mass of mucus a mere secretion from that surface. Physiologists account for the copious collections of mucus sometimes encountered on mucous membranes, by the growth of the nuclei and their offspring, after their deposition upon the surface of the membrane as well as while in its interior.

When the epithelium of a mucous membrane is absent, a superficial excavation is noticed, a mere erosion or abrasion, which is often mistaken for an ulceration involving the proper tissue of the membrane itself. The unevenness observed upon the surface of the mucous membrane in the inflammatory condition is due to the rapid and unequal proliferation of immature epithelium cells, which, transforming into mucus, are making their way through the membrane to the surface, pushing it outwards from behind, as it were; and as this action continues in the localities in which it first set up, the enlargement becomes a more or less permanent one, until the action is changed by treatment or otherwise. There is by no means a necessary destruction of the superficial epithelium of mucous membranes secreting mucus, as met with even in severe catarrhal inflammations, and though they may be purulent in character. In fact, experience would go to show that this condition is exceptional, antecedent to such cases only as evince a disposition to ulceration from their commencement, whether arising from diathesis, violence of action, or want of proper attention at an early period of the disease.

In addition to the mucus found upon the surface of diseased mucous membrane, we sometimes discover fibrin in the secretion, small quantities of it having coagulated spontaneously into clots or flocculi.

In some forms of inflammation of the mucous membrane there is poured out in abundance an albuminoid secretion, which, under certain conditions, becomes concreted into a thin pellicle or membrane, either from coagulation of the fibrin which it contains, or from evaporation of the watery constituents present at the period of exudation.

Most of the inflammatory affections of the throat commence in the pharynx, or pharynx and mouth; though not infrequently they begin in the nasal passages. Sometimes the initial disturbance takes place in the larynx, or even in the trachea or bronchi. Although the pharynx is directly continuous with the œsophagus, the extension of the inflammatory process is less apt to proceed along that tube than to extend into the respiratory tract; and this, most probably, because the flaccid œsophagus is normally closed except during the act of deglutition, and thus is not exposed to atmospheric influences as the respiratory tract is, in consequence of its permanent patulousness. The continuity of the pharynx with the digestive tract renders it liable, however, to participation in diseases of the digestive apparatus; and hence we frequently meet with pharyngeal disease as a consequence of such disorders, especially when of a chronic nature.

The direct action of cold is the most frequent exciting cause of irritation leading to inflammatory affections of the pharyngeal mucous membrane, as it is also the most frequent exciting cause of diseases of the respiratory mucous membrane; and instances are not seldom met with in which irritation of this kind leads to the expectoration of translucent sputa, sometimes from the pharynx, sometimes from the larynx, trachea, or bronchi of the perfectly healthy individual, after sudden or unusual exposure to cold during raw and inclement weather. Such exposure, in a constitution run down by overwork, or predisposed to disease of the throat by reason of the scrofulous or tuberculous diathesis, is liable to lead to serious disease, which may prove difficult to overcome, if it does not lead to permanent and fatal injury.

The next most frequent source of irritation of the mucous membrane of the throat is the inhalation of solid or fluid particles existing in the atmosphere under certain conditions. These act mechanically or chemically upon the structures with which they come in contact. Artisans exposed to the dust of various workshops, attendants in chemical laboratories, and others similarly imperilled, are most apt to suffer in this way.

Another frequent source of irritation, eventuating in inflammation of the throat of a subacute or chronic character, is the inhalation of an atmosphere impregnated with the products of tobacco-smoke. The smoking of tobacco is in itself regarded as an exciting cause of the affection, and, doubtless, is so in a great many instances; and even when not in itself the initial cause of the disturbance, has a great deal to do with its persistence and chronicity. Sore throats, in every way similar to those attributed to the effects of smoking, are met with in individuals who are not at all addicted to the use of tobacco; and a cause of this kind must be very infrequent in females, even in regions where the gentler sex indulge in a use of the weed. The sitting for hours at a time in an apartment the air of which is charged with the fumes of tobacco, such as is the case in lager-beer saloons and concert saloons, so much resorted to by young men of native birth, and Germans of all ages, is a much more frequent source of disease in the throat than the mere smoking of tobacco in one's own house.

Another apparent cause exists in the promiscuous use of hot and cold food and drink at the same meal. Thus we partake of hot soup, or drink hot coffee and tea, and cool the mouth and throat by draughts of ice-water taken at intervals during the meal. Or, after enjoying a warm dinner, we indulge in ice-cream or water-ice, and follow this by a draught of hot coffee. This alternate application of hot and cold to the delicate mucous membrane of the throat can hardly fail, if persisted in, at least to place it in a condition favorable for the inflammatory process. A similar treatment of the cutaneous integument would be quite apt to induce an inflammatory affection of the skin.

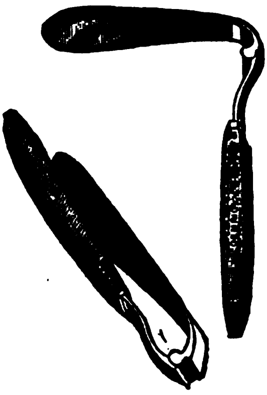
CHAPTER II.

EXAMINATION OF THE THROAT.

Ordinary Inspection.—In all cases of disease of the throat, the parts should always be examined as carefully as the appliances at the command of the practitioner will admit. It is almost incredible, but is no less the fact, that some physicians treat their cases of sore throat with no other guide than that furnished by the symptoms described by the patient. Again and again patients have come under the author's care,—and his experience is by no means exceptional,—who had been under medical treatment for months without having had their throats examined even in the most superficial manner; and this often in instances where a mere glance would have discovered an elongated uvula or hypertrophied tonsils as the source of the trouble, which could have been promptly relieved by an operation occupying but a few moments in its execution. For this there is no excuse. The neglect on the part of the practitioner is culpable. It is so easy to depress the tongue with the handle of a spoon, or merely with the forefinger, and thus obtain a view of the more accessible parts, that one can hardly realize how it can be neglected. There is some excuse for omitting a laryngoscopic or rhinoscopic examination in the early stages of affections of the throat, inasmuch as the manipulation requires a certain amount of skill and practice which every one has not had the opportunity to acquire; but for neglecting an ordinary inspection before a good light, with the tongue depressed, there can be no excuse.

In order to get a good view of the pharynx it is necessary to depress the tongue; and though the handle of a spoon affords a means of doing this, a tongue-depressor, with a handle which is out of the line of vision, is the proper instrument. The ordinary form of the instrument is shown in Fig. 1, and for convenience in transportation the handle is made to fold upon the tongue-piece by means of a hinge.

Fig. 1.



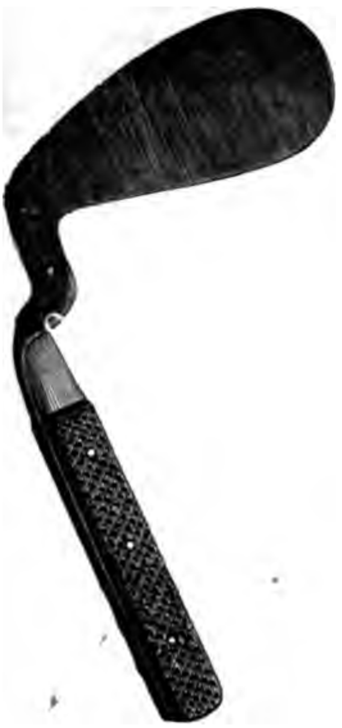
Tongue-Depressors.

Sometimes a good deal of force is required to keep down a muscular tongue; but usually, if the blade is laid lightly upon the organ, and gently but firmly pressed down upon it, any difficulty of this kind can be gradually overcome in a few minutes. To gain a good view of the pharynx, the tongue-depressor ought to be long enough to reach well towards the base of the tongue, and should be hollowed out on its under surface, or else roughened, in order to secure a better hold on the organ. Smooth-faced tongue-depressors are apt to slip forwards towards the tip of the tongue. By gradually pressing the base of the tongue downwards and forwards, and at the same time causing the patient to lower the chin more and more upon the breast, we can almost always expose the entire lower portion of the pharynx, and the crest of the epiglottis, or more or less of its lingual face. Sometimes we can even see the upper circumference of the entire larynx, especially if the epiglottis be titillated with the tip of the tongue-depressor so as to excite a slight motion of gagging. Some patients depress their tongues and open their mouths so well, that, looking down upon the parts, we can see these structures without the use of any tongue-depressor at all. Cases are on record, few in number, it is true, in which by such voluntary effort of the patient a view has been obtained of the interior of the larynx down to the vocal cords; and Tobold mentions one[1] in which he was able to see the action of the lips of the glottis in this manner, and also to recognize a papilloma upon the left vocal cord. Dr. Elsberg, of New York, and Dr. Boisnot, of this city, informed me in conversation, that they had each come across a case in which they could recognize the arytenoid cartilages and the vocal cords in this manner. I have not yet had the gratification of seeing such a case, though I have often seen the entire epiglottis without the use of any instrument whatever. Dr. Tobold also mentions [1] that, with the assistance of a knee-shaped spatula which he has devised for exposing the pharynx, he has been able on several occasions to remove a fibroid tumor situated in the pharynx at the level of the arytenoid cartilages, and which he could not get at even with the aid of the laryngoscope. These statements, surely, ought to convince practitioners of the value of the use of the tongue-depressor as an aid to diagnosis.

---

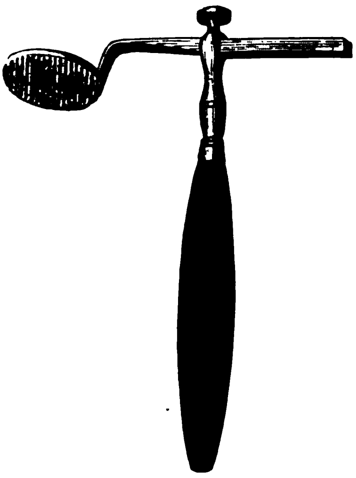
[1] Lehrbuch der Laryngoskopie. 2d Edition. Berlin, 1869, p. 43.

Fig. 2.



Tobold's Tongue-depressor.

Fig. 3.



Türck's Tongue-depressor.

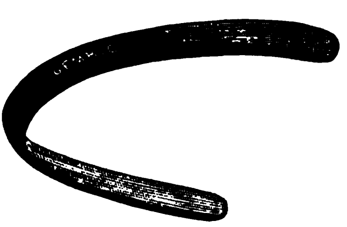
---

[1] Op. cit., p. 42.

Forms of tongue-depressors especially adapted for the use of "unruly members" are depicted in Figs. 2 and 3. They are of metal, with wooden handles, and are very powerful and efficient instruments. The apparatus of Türck is provided with several tongue-pieces of different dimensions, so as to suit for children, or for adults with very large and fleshy tongues.

A tongue-depressor devised by the author,[1] and shown in Fig. 4, has some advantages in special cases, and is particularly efficient in exposing the pharynx in the manner already described. It is composed of a single piece of hard rubber, which recommends itself by the facility with which it can be kept clean and sweet—no slight desideratum when an instrument is frequently exposed to the secretions from the mouth, and to contact with the various caustic substances used in the treatment of diseases of the throat. The shape could be readily altered at will to suit any peculiar conformation of tongue, were this ever necessary, by first holding the instrument for a moment or two in boiling water, or over a flame, so as to render it flexible. The tongue portion is five inches in length, curves gently forwards, and is considerably bent at its terminal extremity, so as to embrace the posterior portion of the tongue in a shallow depression about an inch in length, scooped out of its lingual surface at this portion, thus affording a sufficiently firm hold upon the organ. The handle, which is of one piece with the blade, is bent downwards under the tongue-piece, so that it comes beneath the chin when in use, and thus keeps the hand out of the way; while by drawing the handle forwards towards the perpendicular, the base of the tongue is necessarily pressed downwards and drawn forwards, so as to expose the parts in

Fig. 4.



Hard-rubber Tongue-depressor.

---

[1] The *Medical Record*, Vol. I., 1866, p. 348.

the freest manner. When well applied, it will be no unusual occurrence to see distinctly the anterior or lingual surface of the epiglottis, with perhaps a portion of its crest, the glotto-epiglottic fold, and the lingual sinuses at either side; and, of course, a large extent of the posterior and lateral walls of the pharynx, and more or less of the laryngo-pharyngeal sinuses.

LARYNGOSCOPY.

Within a comparatively recent period there has been perfected a method of examining the more remote structures of the throat, by means of an image of the parts reflected upon a small mirror placed within the pharynx, and held with its reflecting surface downwards to explore the lower structures, or upwards to explore the upper structures. The former method of examination, on account of its chief employment in the examination of the larynx, is known as laryngoscopy; while the latter method has been called rhinoscopy, inasmuch as it is most frequently employed in examinations of the posterior nasal region.

For years and years the profession had felt the necessity, more and more, for some method of exploring the throat better than that afforded by mere inspection through the open mouth with the tongue depressed; and efforts to this end were made in various directions, chiefly to adapt for this purpose the mirror used by the dentist, or some other appliance acting on the same principle of reflection. After many oft-repeated failures, success was at last attained in the production of the laryngoscope now in common use, in some one or other of its many modifications. We cannot spare space in this volume for more than a fact or two in the history of the invention of the laryngoscope; but as it would be unjust to pass the subject by so summarily, we recommend our readers to two of the best and most accessible sources of information on this point.[1]

The credit of the first completely satisfactory demonstration of the feasibility of examining the larynx in the living subject belongs to Manuel Garcia, a teacher of vocal music in London, whose experiments and observations were made solely in the interests of vocal music. A perusal of Garcia's publications stimulated Professor Ludwig Türck, of Vienna, to employ the instrument for professional purposes, but finding a difficulty in its application, principally on the score of insufficient illumination, and being occupied at the same time by researches of another nature, he gave up for the time his experiments in this direction. Prof. Czermak, of Pesth, borrowed his mirrors from Prof. Türck, and, conceiving the idea of employing artificial illumination, was enabled to perfect the application of the instrument; and he taught its use to his professional brethren throughout Europe with great zeal, so that he is entitled to the fullest honor as the chief promoter of the use of the laryngoscope in medicine. He also conceived the idea of reversing the position of the mirror, so as to obtain an image of the posterior nares and naso-pharyngeal region, and thus invented the art of rhinoscopy.

---

[1] Mackenzie; The Use of the Laryngoscope. 2d and 3d editions, London, 1866 and 1871. Tobold; Lehrbuch der Laryngoscopie. 2d edition, Berlin, 1869.

The laryngoscope consists essentially of a small mirror, of simple construction, which is to be passed into the pharynx, and held there in such a position that it will reflect an image of the laryngeal structures and parts adjacent.

It thus permits the inspection of structures beyond the limit of direct visual examination.

A good light is an indispensable pre-requisite to a laryngoscopic examination; and when this can be obtained from the solar rays, no other appliance is required than the simple mirror.

This laryngoscopic mirror, as it is called, is then the only absolutely essential instrument required for laryngoscopic observation.

When the daylight is too feeble for our purpose we employ certain appliances, such as lenses and reflectors, to concentrate its power; otherwise, we resort to the use of artificial illumination.

Inasmuch as it is only at certain hours of the day that the sunlight is at our convenient disposal; and inasmuch, in addition, as the peculiarities of our climate do not often afford us the opportunity of employing the sun's rays at the desired moment, or in the desired location, it has been found expedient, by those who have frequent occasion to use the laryngoscope, to have recourse to artificial illumination at all times. This habitual use is the more necessary, because parts appear redder and more yellowish by artificial light than they do by sunlight; and therefore, unless due allowance be made for this difference, there is danger that the same condition which was recognized as normal by sunlight, may appear as if inflamed when examined by gas or lamp light, and thus lead to the adoption of measures of interference which might better have been abstained from.

The laryngoscope has, in the most literal sense, thrown light upon many an obscure condition which would otherwise have remained unrecognized, and have been liable to misinterpretation in the gloom of subjective investigation alone. In the case of many a despondent and all but abandoned sufferer, it has indicated a means of rescue from the very clutch of impending death.

The brilliant successes in laryngoscopic surgery have been duly proclaimed in current medical literature, and have stimulated many professional laborers to engage in the development of the same field of usefulness. The first decade of laryngoscopic research has but recently passed its completion, and already the laurels which it has added to the crown of Æsculapius are equal in freshness, imperishability, and gracefulness to those culled in any other portion of his broad domain.

The literature which laryngoscopic observation has tendered for perusal during these ten or twelve years is very extensive, and the lessons it has taught have won for it a distinguished position among the valued records of medical and surgical learning.

As is perhaps but naturally incident to the development of a new subject, its zealous votaries have coerced an inordinate amount of ingenuity in the invention of novel appliances for laryngoscopic examination, and still more so in the invention and adaptation of implements for surgical interference by its aid. One who has not followed the subject closely, in all its ramifications, from its very inception, can hardly realize the extent to which this instrumento-mania has run rampant.

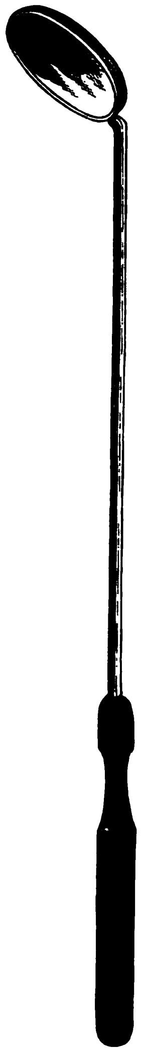
Almost every ostensibly useful instrument that has been devised in this specialty has been subjected by the writer to the actual test of practice. Some of the instruments employed at an earlier date have been abandoned for others which are more serviceable. Many others have been found superfluous; and not a few are actually impracticable in application upon the conscious subject.

The author will aim to convey to the reader the unprejudiced results of his own experience in the department of laryngoscopy. Only such appliances as have proved the most useful of their class will be brought to notice; and while the endeavor will be made to record nothing that has not a directly practical bearing, care will be taken, as far as possible, to avoid the omission of anything essentially useful.

The Laryngoscopic Mirror.—The form of the laryngoscopic mirror is not a matter of much importance. The very best form is that adopted by Prof. Türck and depicted in Fig. 5.

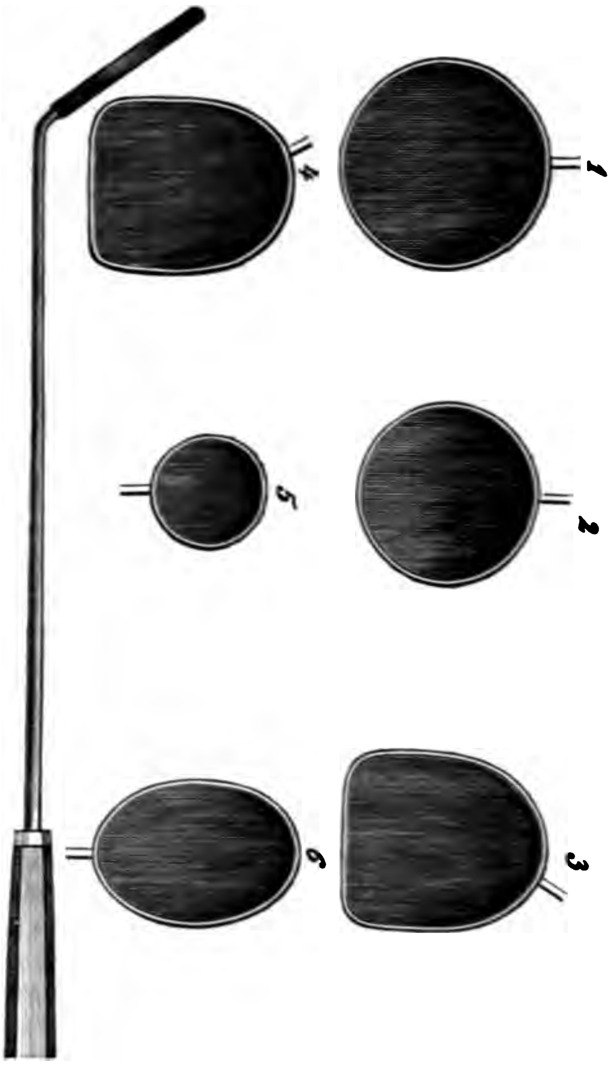
It is a circular glass mirror of the finest quality, mounted in a narrow setting of German silver, and attached, at an angle of 120°, to a stout shank of the same metal; a wooden handle being attached to the shank. The glass has a diameter of one inch, and the entire instrument is eight inches in length. This mirror will meet almost every indication in the adult. Occasionally, and almost constantly in children, a mirror of smaller diameter will be required; while a mirror of much greater dimensions can sometimes be very readily employed. It is obvious that the larger the mirror that can be used in any case, the more satisfactory will be the examination. When enlarged tonsils protrude into the isthmus

Fig. 5.



Laryngoscopic Mirror of Circular Form.

Fig. 6



SIDE AND FRONT VIEWS OF LARYNGOSCOPIC MIRRORS OF DIFFERENT FORMS AND SIZES (AFTER TOBOLD).

1, 2, 5. Ordinary mirrors.
3, 4. Mirrors with stem to the side.
6. Oval mirror for use in cases of enlarged tonsils.
Side view of Türck's circular mirror.

of the pharynx, a mirror oval in its vertical diameter must be used, in order to pass these glands and reach the posterior wall of the pharynx. Under these circumstances we may employ a mirror an inch in length, and from five-eighths to seven-eighths of an inch in its broadest transverse diameter.

In order to be enabled to examine all classes of cases as they usually come under observation, the practitioner should be provided with at least four mirrors: three circular ones of five-eighths, three-quarters, and one inch diameter respectively, and one oval one of five-eighths inch transverse diameter. Other mirrors may be better adapted to exceptional cases, but such cases are rare. Should but a single mirror be desired, the inch-mirror should be selected, as apt to fulfil the greatest number of indications.

Some observers have recommended square and dome-shaped mirrors, with the shank soldered at one corner. There is no objection to their use; but, as a rule, the circular mirrors will be found to be better borne by the patient. It has also been recommended that we should have mirrors at hand soldered to the stem at various angles, as more likely to meet varying indications. This is altogether unnecessary, for a slight motion of the fingers and wrist will enable the observer to give the mirror any inclination he may desire after introducing it, and the emergency is thus provided for.

A mirror firmly soldered to its handle is preferable to one in which the stem is made to slide in and out.

Some observers have expressed a preference for a mirror with an acuter angle of attachment to its stem. This is altogether a matter of choice. It is really an affair of little moment whether the angle is a little greater or a little less; for it is to be presumed that, once familiar with the use of the instrument, an expert manipulator could employ any mirror to which he might have access.

An extensive experience with mirrors of every description has demonstrated, in the most practical manner, that the habitual employment of the mirror at an angle of 120°, as first adopted by Türck, will fulfil nearly every indication.

The quality of the reflecting surface, however, is a matter of considerable importance. A laryngoscopic mirror should afford a perfect image. Its quality may be tested by holding it over a piece of white paper. The reflection should be perfectly white; if it be bluish or yellowish, the laryngeal image will be sure to lose in distinctness in proportion to the departure from a pure white, and thus to vary somewhat from the normal color of the parts.

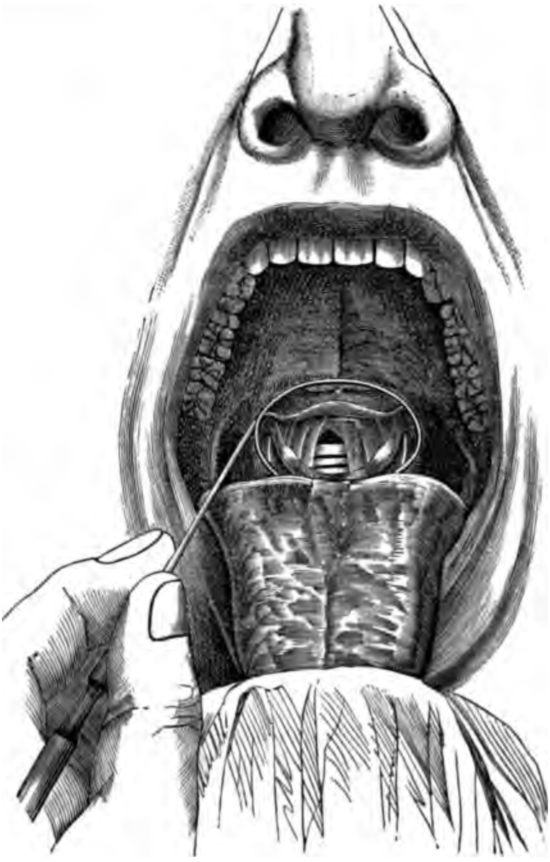
Laryngoscopic mirrors have been constructed from steel which has then been highly polished, and from other metals with surfaces of great lustre. These are very serviceable while new and unscratched, though presenting a violetish tinge to the reflection of white paper; but they soon become tarnished by usage, and are kept in order with difficulty. They are applicable only to special cases in which but a very small mirror can be employed, and when it is a matter of some moment to avoid the loss of reflecting surface which even the narrowest setting would sacrifice in the glass mirror. Such a case occurs when it is necessary to make an examination through an artificial opening in the trachea.

Introduction of the Mirror.—The position of the mirror in the pharynx of the patient, its manner of introduction, and the character of the image which is seen upon it when in position, is depicted in Fig. 7. The mirror is represented as having been placed at an angle of about 45° with the plane of the larynx; but its position in practice will vary in different individuals, in consequence of peculiarities of conformation. Much, too, will depend upon the degree of flexion given to the patient's head, the position of the observer's eye, and other contingencies which will become apparent as we proceed in the discussion of the subject.

The manner in which the laryngoscopic mirror is most conveniently used is as follows:—

The patient is seated in a chair in such position that a strong light shall illumine the pharynx, and especially the lower portion of the soft palate. This examination may be made in the open air, before a window, or in front of a lamp or other artificial light. The observer seats himself in front of his patient, at such distance as to obtain distinct and clear vision of the soft palate and the posterior wall of the pharynx. The head of the patient should be kept erect, or very slightly bent backwards. The position may have to be varied from the one to the other after the mirror has been introduced; but for the majority of cases a favorable position will

Fig. 7.

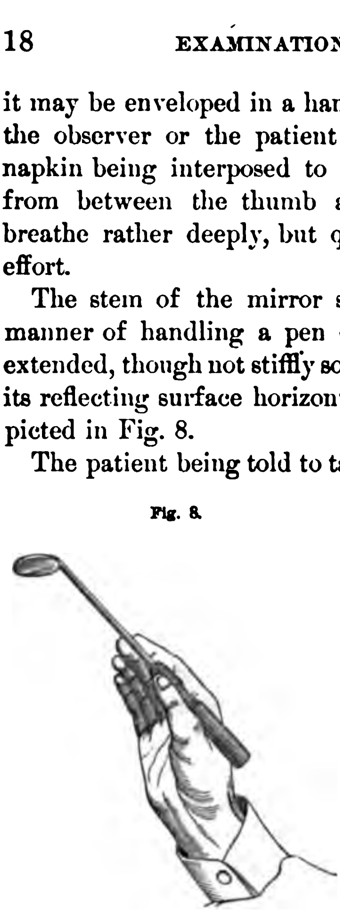


The laryngoscopic mirror in position.

be such a one as shall place the lower border of the upper incisor teeth upon a horizontal plane with the base of the soft palate. The mouth should be widely distended, and the tongue thrust forward towards the chin with considerable muscular force, its body lying upon the floor of the mouth, and its posterior portion and base rendered as concave as possible. In this position it may be enveloped in a handkerchief or napkin, and held by the observer or the patient himself, as most convenient; the napkin being interposed to prevent the tongue slipping back from between the thumb and fingers. The patient should breathe rather deeply, but quietly, synchronously, and without effort.

The stem of the mirror should be taken in the hand in the manner of handling a pen or lead-pencil, the wrist being well extended, though not stiffly so, the mirror pointing upwards, with its reflecting surface horizontal and looking downwards, as depicted in Fig. 8.

Fig. 8.



Manner of holding laryngoscopic mirror previous to its introduction.

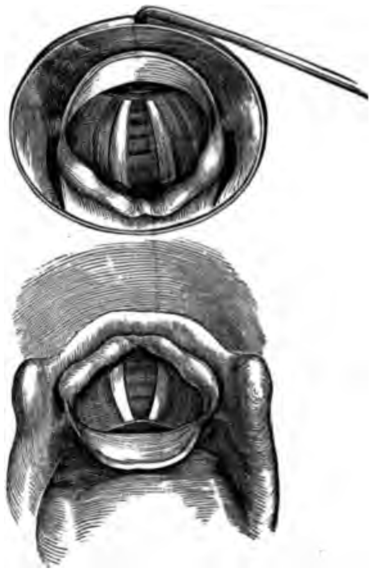
The patient being told to take a deep inspiration, so as to raise the palate, the laryngoscopic mirror is passed well above the tongue, directly backwards, until it reaches the uvula, when, receiving the uvula on the back of the mirror, the wrist is flexed, and the mirror landed with its lower border on the posterior wall of the pharynx; the uvula and soft palate being pushed backwards and somewhat upwards in the manœuvre. The stem of the mirror is now horizontal, and the reflecting surface looks obliquely downwards and forwards. When the palate is raised very high during a deep inspiration, the mirror can be placed in position without pressing upon it, and then, as expiration is effected, the palate falls gently upon the back of the mirror. This method of procedure will be found serviceable in the examination of nervous individuals.

The mirror being properly introduced, we perceive in it an image of the larynx and adjacent structures, but in a reversed position, though not an inverted one; that is to say, those structures which are posterior in reality are anterior in the image, and what is really in front looks as if it were behind, the relative positions of right and left being unchanged.

This condition of things will be rendered intelligible at a glance by consulting the accompanying illustration, Fig. 9.

The structures (base of tongue, and epiglottis) which are above and in front in the patient, appear above and behind in the mirror; the parts (arytenoid cartilages, etc.) which are below and behind in the patient, appear below and in front in the mirror; but the structures which are in reality on the right hand of the observer in the patient, are on his right in the mirror also. In other words, those parts nearest the mirror are seen as if they were nearer the observer, who views them very much as he would do if he could look at them from behind with his eye in the position of the laryngeal mirror.

Fig. 9.



Relative relations of larynx and its image in the laryngoscopic mirror.

The lower figure represents a view of the base of the tongue and the larynx in the relative position they bear in the person who is being examined, while the upper figure shows the image as seen in the mirror. If the reader will hold a laryngoscopic mirror (or, in lieu of it, a piece of looking-glass) obliquely above the lower figure and behind it, so as to receive its reflection, he will get some such an image as is pictured in the upper figure. This diagram will be found useful in studying the relation of parts in actual practice.

There are certain important points in reference to the introduction of the laryngoscopic mirror which require elucidation with some detail.

The mirror must be warmed before it is passed into the mouth. If introduced cold it will become blurred by the halitus of the breath, and we will only be able to obtain an intermittent indistinct view, as each successive inspiration clears the glass of some of the moisture condensed upon it. To avoid this result, we heat the mirror before introducing it. Various methods have been devised for this purpose, some of them ingeniously ridiculous, such as keeping an electric current traversing the mirror; but it is only necessary to mention the best method, and that is to heat the reflecting surface over a flame. In this way the mounting is not so apt to become warm enough to burn the tissues. We avoid burning the patient by testing the back of the mirror on the hand or cheek before introducing it into the pharynx. Care must be taken not to heat the mirror too much, for that will cause the amalgam to run and thus destroy its reflecting power. All that is required is a gentle warmth, under the influence of which the mirror will remain untarnishable for several minutes. If a cold mirror is placed over a flame, the moisture of the apartment condenses on its surface immediately, and is then gradually evaporated from circumference to centre. The moment the mirror clears, it will be fit for use.[1] This usually occupies but a couple of seconds, the time varying with temperature and season.

If the mirror is not well made, the heat will, after a while, affect the coating and destroy its reflecting power; and this is particularly the case with the common quicksilvered mirrors, which are thus soon rendered unfit for use.

We must not retain the mirror too long at a time in the mouth. It is better to reintroduce it several times, than to fatigue the parts by keeping them too long in a constrained position. In this way we avoid the induction of congestion, or of irritability and spasm.

Impediments to the Examination.—Ordinarily there should be no difficulty whatever in immediately effecting a satisfactory laryngoscopic examination, at the hands of any one possessing moderate skill in the use of the instrument.

Occasionally, however, impediments are presented, a consideration of which is necessary.

---

[1] For this hint the author is indebted to Dr. Elsberg, of New York. *The Medical Record*, vol. i., p. 276.

There may be unwillingness or inability to open the mouth properly. Now it is very necessary that the mouth should be wide open, the wider the better. Some patients can open the mouth well enough, but they close it involuntarily as soon as the attempt is made to pass in an instrument. If, after a little moral persuasion, it is found impossible to keep the patient's mouth open wide enough, we resort to a mouth distender or speculum, and pass the laryngoscopic mirror through it. Of these there are many forms. A short glass speculum, similar to that employed by the obstetrician, but unsilvered and not blackened, about an inch and an eighth in diameter, will answer the indication, and permit the passage of an ordinary mirror. Under these circumstances the tongue is retained in the mouth, and is kept depressed by the position of the speculum. Trouble of this kind, however, is infrequent, and the practitioner will rarely have occasion for the use of a mouth distender; though it may be mentioned in passing that such a contrivance will be found highly convenient in making applications to the throats of refractory patients.

The management of the tongue sometimes becomes a matter of considerable annoyance. At the commencement of a laryngoscopic examination it will often be found, too truly, an unruly member. The position of the organ most favorable for the purpose is obtained when it is moderately protruded by the action of its own muscles, its body resting quietly upon the floor of the mouth, and its base guttered into a broad sulcus. It requires some practice for the majority of individuals to accustom themselves to maintaining the tongue in this position, but the ability to do so is readily acquired by frequent practice, especially before the glass.

Then again, the tongue often rises up involuntarily as soon as any foreign body passes the teeth, and it may rise sufficiently to push the mirror to the very roof of the mouth. It is necessary that the base of the tongue should be directed forwards and downwards, so as to increase the pharyngeal space, and to draw the epiglottis up by the tension on the glotto-epiglottic ligament; for the epiglottis in most people overlooks the laryngeal aperture, and, unless moderately erect, it will, to a greater or lesser extent, intercept the view of the intra-laryngeal structures. It is an excellent plan to instruct the patient to hollow his tongue at the base, and then thrust it forcibly forwards out of the mouth; when, if he cannot maintain it in this position without aid, it may be held by the thumb and fingers of the disengaged hand of the observer, guarded by a glove, handkerchief, or napkin; or, what is more convenient, for many reasons, the tongue may be intrusted to the patient's own fingers. The fingers of the patient in holding his tongue should be applied above and the thumb below, and he should use the right hand when the observer intends to hold the laryngoscopic mirror in his own right hand, and *vice versâ*. This will keep the fingers out of the way. The tongue should not be pulled downwards with any force, lest the frænum be injured by pressure upon the incisor teeth. If any result of this kind is to be apprehended, it may be prevented by the interposition of a compress. A great deal of ingenuity has been manifested in the invention of tongue-depressors and tongue-forceps for the purpose of retaining the tongue in the desired position. The employment of any mechanical contrivance whatever for holding the tongue is greatly to be deprecated, and should be avoided as a rule. Occasionally it does seem impossible to get along without something of the kind, but the alternative is to be acknowledged with reluctance.

If the tongue is so fleshy that it occupies too much space in the cavity of the mouth, or so restless that it keeps bobbing about, we can often press it down or restrain its movements by the simple contact upon it of a pen-handle, pocket-probe, or even the forefinger; something to steady it, as it were.

At times, however, a tongue-depressor is indispensable. The tongue-depressor in ordinary use is not suitable for the purposes of laryngoscopy, inasmuch as it depresses the anterior portion of the tongue merely, forcing the base backwards upon the epiglottis—the very effect we wish to avoid. Nor should we use one that is fenestrated, for it permits a portion of the tongue to rise through the fenestrum, thereby intercepting the view.

The tongue-depressor pictured in Fig. 4 is believed to fill at least every indication claimed for many of the more elaborate and complicated appliances that have been invented for the same purpose. The handle, being bent upon the tongue-portion at an angle, turns in towards the neck when the instrument is applied to the tongue; thus the hand in which it is held is kept out of the observer's way; while, by bringing the handle forward towards the perpendicular, the base of the tongue is necessarily pressed downwards and drawn forwards, elevating the epiglottis, and securing a favorable position for successful examination.

This instrument, or a substitute, frequently introduced by the patient at home, will overcome sensibility of the base of the tongue, whether preternatural or ordinary.

With such a tongue-depressor, properly constructed and well applied, it will be no unusual occurrence to expose at once to direct vision the lingual surface of the epiglottis with more or less of its crest, the glotto-epiglottic ligament or fold, and the lingual sinuses at either side; and, of course, a large extent of the pharynx. Once in position, it can be very advantageously intrusted to the management of the patient. It is to be understood, however, that this tongue-depressor is not recommended for habitual use. It is better to avoid every artificial means to hold the tongue, and we can avoid doing so in nearly every case, if time permits. A little practice will enable the patient to maintain his tongue in a favorable position; and as contact with the organ can be avoided in the introduction of the mirror by the motion of flexion of the wrist, as already described, the tongue-spatula can almost always be dispensed with.

"Irritability of the fauces" is another obstacle occasionally presented, though by no means as frequently as is ordinarily imagined. Nearly every unsuccessful attempt at laryngoscopic examination attributed to this cause is due to irritability in the hand of the manipulator, and this may arise from want of skill and want of patience on the part of the examiner. This once overcome, irritability of the fauces will cease to present any embarrassment. Sometimes, however, there does exist a great deal of irritability of parts, and occasionally to a considerable degree, but the instances are few and far between. It may often be overcome by impressing the patient with the necessity of controlling it by strong mental effort. Gentle manipulation of the parts with a probe or groove-director will often succeed. Astringent and other solutions may be applied locally to the parts. If time is not of much importance, and other circumstances permit, large doses (30 to 60 grs.) of bromide of potassium may be given, at intervals of three or four hours, for three or four successive doses; and they will be found occasionally to induce a considerable amount of tolerance of manipulation. Gargles, and sprays of alum, tannin, bromide of potassium, and bromide of ammonium; sprays of sulphuric ether, rhigolene and chimogene; pencillings with astringents and caustics; pencillings with solutions of morphia in chloroform; the local contact of small bits of ice; the inhalation of from ten to twenty drops of chloroform, and a still longer list of other methods have been recommended for this purpose. Many of the most inefficient of these have been those most highly extolled, perhaps from having chanced to succeed in the only case in which they were tried. Of all these devices the best are the contact of the nebulized spray of a solution of tannin, and the inhalation of a few whiffs of chloroform. But the most judicious plan will be found to consist in overcoming the sensibility of the parts by repeated contact of the laryngoscopic mirror.

The writer some years ago expressed the opinion[1] that this irritability of tongue and fauces is in the main due to indigestion, and often attendant upon the digestive act itself. Hence he adopted the simple plan of not making the examination in such cases until three or four hours after a meal. This expedient has been found to answer its purpose in a large proportion of instances. When marked disorder of the digestive apparatus exists, a smart purge administered the night previous will lessen the sensibility of the parts the next morning.

Enlargement of the tonsils may prevent the introduction of the circular mirror, and render the employment of an oval one necessary. If the mirror used be broader than the space between the hypertrophied glands, it is to be pushed right back between them and behind; and although they cover the side of the mirror somewhat in resuming their position, sufficient reflecting surface usually remains exposed to permit of a satisfactory examination. The movement of passing the tonsils must be done with great celerity, and it is then hardly recognized by the patient. If the tonsils are hypertrophied to such an extent as to preclude the introduction of the oval mirror, they must be excised.

---

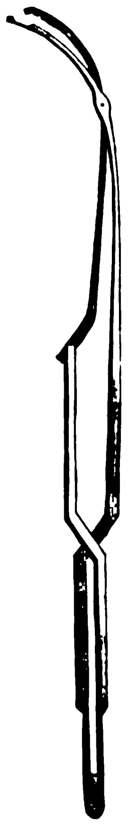
[1] The *Medical Record.* 1866, vol. i., p. 349.

Elongation of the uvula may become a source of difficulty, by hanging below the mirror, reflecting its own image, and intercepting the view of the parts to be examined. If it cannot be retracted by titillation or astringent applications, the exuberant portion must be clipped off.

An unfavorable position of the epiglottis is a much more serious obstacle than any which has yet been discussed. Here, Nature has occasionally placed an impediment to laryngoscopic examination. Sometimes as a congenital conformation, sometimes as the result of cicatrization, sometimes as an acquisition dependent upon a vicious mode of utterance in public speaking, we once in a while meet with a depressed epiglottis, which overhangs the vestibule of the larynx to such an extent as to preclude the passage of light to its interior. When this condition exists in but a slight degree, and more especially in acquired cases, it may be overcome by frequently pulling the valve forward with the finger. The patient can very readily be instructed to do this for himself. Or we may pass a suitably shaped broad blunt hook behind the epiglottis and pull it forward. Very often we can gain a momentary view into the larynx by causing the patient to make an ironical laugh, or to make a vocal sound during inspiration, or to make a sudden inspiration, or to utter the sound *eh* with a very high pitch. These movements throw the epiglottis upward for the moment.

Where we wish to make a thorough examination under these circumstances, or even a superficial examination in bad cases of this condition, we must resort to some mechanical contrivance to raise the epiglottis forcibly and maintain it in an erect position. One of the best is a stout rod bent nearly to a right angle at its extremity for about an inch, with the terminal point turned backwards. If we are merely making a diagnosis, we intrust the tongue to the patient himself, and introducing the laryngeal mirror with one hand, with the other introduce, by the aid of the reflection in the laryngeal mirror, this rod or staff (Voltolini's staff) beyond the epiglottis, against the laryngeal face of which the bent portion is to be pressed, and as the rod is drawn forward, the epiglottis will be forcibly raised and held in position. The terminal point of the rod which is turned off from the rest of the hooked end cannot press against the epiglottis, and thus the pain of the operation is lessened. A stout whalebone rod squared at the bent portion will answer the purpose admirably. The introduction of this staff requires a good deal of skill. The manipulation must be made quietly, but with a firm though gentle touch. We need not handle the parts roughly just because we must take a decided hold of them.

Fig. 10.



Von Bruns' pincette for holding up the epiglottis.

When, however, an application is to be made within a larynx with a depressed epiglottis, we need an appliance, which, when in position, can be held by the patient or left to itself, for we will have both hands employed with other instruments. For this purpose epiglottic pincettes, forceps, hooks, needles, snares, etc., have been devised, to seize the epiglottis and hold on to it. It is no easy matter to seize the epiglottis, pierce it with a threaded needle, and thus control it; it is not even easy to seize it with toothed forceps. And when seized in this way, it is very intolerant of the manipulation. The forceps and pincettes devised for holding the epiglottis are intended to hang on to it during an operation, and keep it erect by their weight. One of the most convenient instruments for this purpose is the toothed forceps of Von Bruns, depicted in Figure 10. The edge of the epiglottis is seized between the serrated blades, which close tightly upon it when pressure is taken from the spring handle, and the instrument is allowed to hang out of the mouth during an operation. A reliable instrument for managing a depressed epiglottis has not yet been invented.

These instruments, however, require care and discretion in their employment, for Schrötter, than whom there are but few more skilful laryngoscopists, lost a case from extensive laryngeal œdema consequent upon the use of Von Bruns' instrument for raising the epiglottis.[1]

When the depression of the epiglottis has been produced by the contraction of cicatricial tissue, this must be divided by one of the instruments to be described in the sequel.

The manner of breathing sometimes presents an impediment to the examination. Nervous individuals are excited by the paraphernalia incident to a laryngoscopic examination, especially if by artificial light, and are apt to breathe in a hurried, constrained, or spasmodic manner. This irregular respiration must be overcome preparatory to a successful result. By breathing in time with the patient; by accompanying the breathing at first with a sound allowed to become less and less audible as respiration progresses; by beating time, or by some similar method, we control the excitability of the patient, and then proceed to the examination as quietly and as gently as possible.

In fact, the great secret of success in laryngoscopic examination is to take time for it, and to have patience with the patient. It is useless to hurry a patient or to scold him roundly, for this only excites him the more, and the greater the excitement or dread under which he is laboring, the greater is his susceptibility to spasm from the contact of the mirror. If time enough cannot be devoted to the object to proceed deliberately, the attempt had better be abandoned, or postponed to a more convenient period.

In view of overcoming the sensibility of the pharynx and palate,—parts which are pressed upon during a laryngoscopic examination,—and thus securing a more prolonged tolerance of the presence of the mirror, it has been suggested to resort to the induction of anæsthesia. Complete anæsthesia is not applicable to the requirements of laryngoscopic manipulations, because we desire to maintain the head, mouth, and tongue in certain positions, and it is necessary in almost every examination, and much more so in the performance of a laryngeal operation through the mouth, to avail ourselves of the co-operation of the patient, whom we direct to make this or the other physiological movement, which will raise the epiglottis, depress the tongue, approximate or separate the vocal cords, etc., in order to bring into view certain structures which would otherwise remain out of the line of vision.

---

[1] Medizinische Jahrbücher, 1868, xv. Bd. p. 72.

Apparatus to increase the Illumination.—It has already been stated that a good light is an indispensable pre-requisite to a laryngoscopic examination. The manipulation of the laryngoscopic mirror is substantially the same, no matter whence the source of light may be derived.

It is only during a short period of day, while the sun's rays incline to the horizontal, that we are enabled to avail ourselves of direct sunlight, the brightest illumination that we can employ.

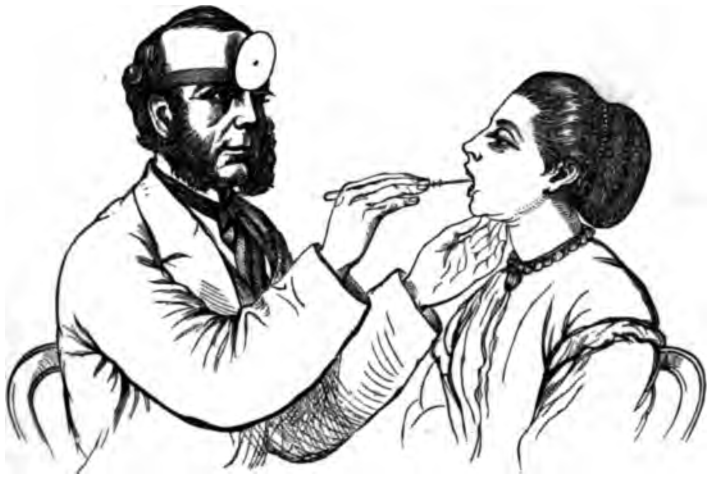
When the time of day, or location of the examining-room, is unfavorable to the utilization of the direct light of the sun, we may reflect the rays to the desired point by receiving them upon a small plain looking-glass capable of being turned obliquely in the desired direction. This glass is placed on a convenient support, as a stand or table, so that it will receive the sun's rays upon its surface. A cone of light may thus be reflected to a distant point of the apartment, say against a wall, and the patient be then seated so that his mouth will intercept the cone. The pharynx will then be brilliantly illuminated, and the examination can be proceeded with as already described. As the day advances the position of the patient will have to be altered in compliance with the track of the sun.

Sometimes a plane mirror, attached to the forehead of the observer, is used as a reflector of direct solar light.

More frequently and more conveniently a concave mirror is used to reflect the diffuse daylight of the apartment. This is the laryngoscopic reflector, devised by Czermak. It consists of a concave mirror of circular form, about three and a half inches in diameter, with a focus suited to the visual power of the observer. A focus of from eight to twelve inches can be used by the majority of persons; but occasionally a reflector must be made especially to suit the focal distance of the observer's vision. In employing this reflector the patient sits so that the light is towards his back or to one side, and the observer sits opposite to him, with the reflector in his hand, or upon a stand at his side, or attached in some manner to his forehead. Under any circumstance the mirror must be mounted in such manner as to be susceptible of receiving any degree of inclination or obliquity. The light is then received upon the reflector, and thence reflected into the mouth, upon the spot to be occupied by the laryngoscopic mirror.

The accompanying drawing exhibits this mode of examination.

Fig. 11.



Examination by reflected light, with reflector on forehead (from Bonnet).

Examination by Artificial Light.—In employing artificial illumination, we may use either direct or reflected light. The former method is the favorite one in France; the latter generally preferred in Germany, Great Britain, and the United States.

The best light to use is that of gas, or coal oil. Coal oil furnishes the whiter and more constant light; gas is the more convenient in management.

In order to concentrate the power of the light it is customary to place a condensing lens in front of it. In examining by direct light, the lamp, with the lens in front of it, is placed upon a small stand or table behind which the observer sits. A shade behind the light protects his eyes from its direct glare. The patient is seated directly in front of the light, which is placed at such a height as to cast its rays straight into his mouth. The examiner then passes his arm around on one side of the lamp and makes the examination as by solar light. This is a very good method, requiring but little apparatus; but it is rather awkward, in consequence of the light being between patient and observer, and because its direction cannot be changed without suspending the examination. It is far inferior in convenience to examination by reflected light, though, perhaps, occasionally more advantageous in affording a brighter illumination.

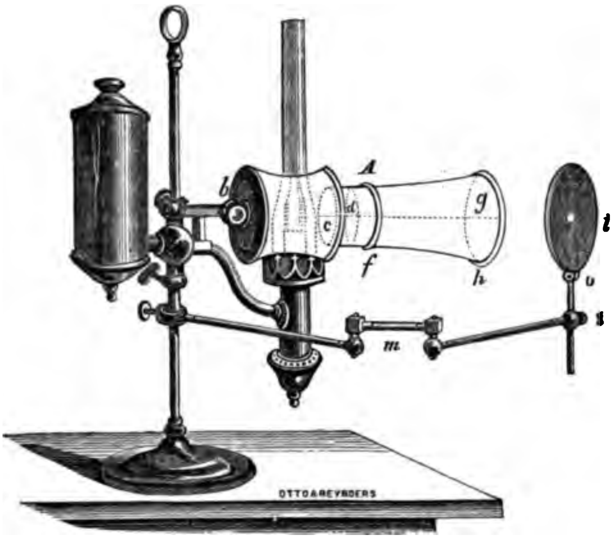
In examining by reflected light, we place the lamp most conveniently to one side (usually the right side) of the patient, a little behind his head and about the level of his ear; or we may place the light directly behind and above the patient's head. Then sitting in front of him we receive the rays of light upon a concave reflector, having one-half the focal distance of that with which we work by sunlight. Under these circumstances we use the disc of light just within or just beyond the inverted image of the flame as the illuminating medium, and it affords but a small extent of luminosity. By placing a condensing lens in front of the light, we collect its rays and obtain a large circle of illumination to cast into the mouth.

The best illuminating apparatus yet devised for laryngoscopic examination is that of Tobold, as depicted in Fig. 12.

We transcribe essentially Dr. Beard's translation of Tobold's description of this illuminating apparatus.

"Two powerful convex glasses (*c* and *d*) of equal refraction are fastened in a brass tube, one before the other, close to the cylinder of a lamp. A ring separates them one line apart, so that the surfaces of the glass do not rub together. A third lens (*g*), of three-fourths as great refraction, but of larger aperture, forms the point of exit for the converging rays. The apparatus can be adapted to any ordinary sliding lamp. To secure the most intense light, we must take care that the inner lens (*c*) should be brought close to the cylinder of the lamp, by means of the movable bar (*b*). It is evident that the apparatus should be so arranged that the middle of the flame should fall as accurately as possible in the axis of the lens. This axis is indicated in the cut by a horizontal dotted line.

Fig. 12.



Tobold's apparatus for artificial illumination (after Tobold).

"The movable doubly articulating arm (*m*) is always fastened beneath the oil-holder of the lamp.[1] When it is necessary to clean the lenses (*c*) and (*d*) the apparatus is unscrewed at (*f*). The large outer lens (*g*) can be taken out for the same purpose, after removing the ring (*h*).

The concave reflecting mirror (*i*), 7½ centimetres in diameter, is made of glass, covered with pure galvanically precipitated silver, and is fastened in metal. It is perforated in the centre, and is provided with a stem of about 10 centimetres in length, so that by means of the screw (*s*) it can be moved up or down to the desired position. The inclination backwards or forwards, occasionally necessary, is accomplished by means of a simple hinge, (*o*) on its border. A lateral inclination of the reflector is entirely unnecessary, since this position can be readily secured by the movable arm.

---

[1] **We have found it more convenient to place this arm above the source of illumination, allowing the reflector to hang down in front of the apparatus.**

"To those physicians who have to examine a great number of patients daily in the office, I recommend the use of a stand for holding the lamp, as is shown in the accompanying cut, Fig. 13. By this arrangement an appropriate position of the whole apparatus can be secured at any instant during an operation by easy manipulation, without laying aside the instruments that are in the hand. A rod (E) runs through an iron clamp, (F) that is fastened to the table, and by means of a screw, (*g*) can be fixed at any height corresponding to the size of the patient. The metallic horizontal arm (H), on a movable ring on the stand, holds a short movable rod (*i*), on which the lamp and its accompanying brass tube is attached and screwed, as on its usual support.

"The rod (X) permits the lenses to be adjusted to the centre of the flame.

"The arm (K), with three joints, turns directly on the frame (*s*)."

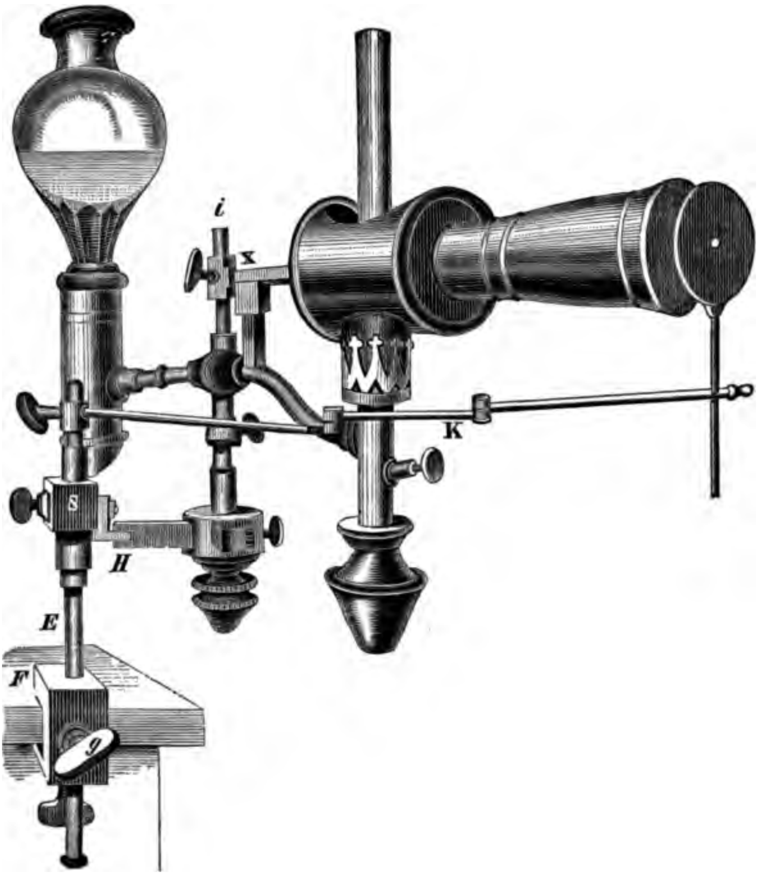
The source of light here represented is in each instance a coal-oil lamp, the German student lamp, capable of being set at any elevation upon the support, and of being changed at will.

In using this apparatus the flame should be placed about on a level with the patient's mouth, but not near enough to incommode him by the heat.

A more convenient method of using this apparatus is to take the support from the floor, and to have the reflector suspended above the lenses, as shown in Fig. 14. This keeps the supporting rod out of the way of the left hand when operating upon the larynx.

The apparatus was originally arranged in this way by the writer for his own use, the source of light being an argand gas-burner fed from a convenient bracket by means of flexible tubing. This adaptation of the Tobold lamp leaves little to be desired. The entire illuminating apparatus, light, lenses, and reflector, being attached to a rod movable in the socket of the supporting stand, can be adjusted readily at any height, and turned in any direction without moving each portion separately as in the original apparatus.

Fig. 13.

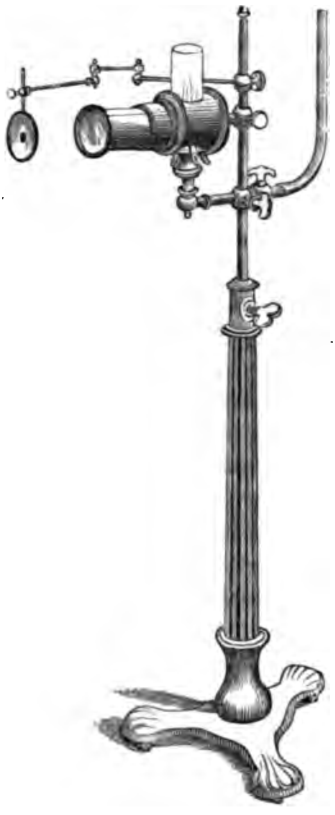


Tobold's apparatus for illumination, with stand (after Tobold).

Almost all the reflectors furnished by the instrument-makers are perforated in the centre. This arises from the fact that Czermak took the idea of the laryngoscopic reflector from that of the ophthalmoscopic one. It is occasionally advantageous to make use of the perforation, so as to look in the very axis of the rays of light. The perforation is by no means essential. The reflectors attached to the head are sometimes suspended before one eye. In that case they must be perforated. A band, pad and spring, or a spectacle frame, is the usual means of attaching the reflector to the head. The most convenient method is to use a head-band of elastic webbing.

In employing artificial light we must shut out any excess of daylight. A dark shade before the window suffices. It is unnecessary to exclude the sunlight so much as to render it difficult to distinguish objects about the room.

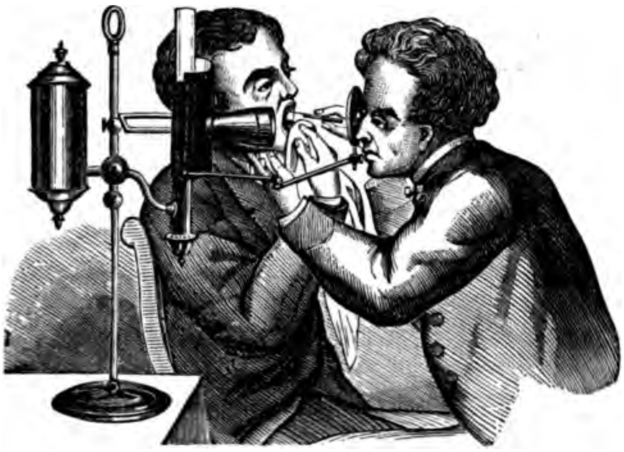
Fig. 14.



Tobold's Illuminating Apparatus, fed with gas, supported from floor, with arm of reflector above the lenses, the whole movable up or down, right or left, by means of a supporting rod, sliding in the socket of the stand.

The ingenuity of Dr. Tobold led him to devise a small pocket illuminator (Fig. 15), for transportation to the residence of patients; the larger one being rather cumbersome for this purpose. It is constructed on the same principles as the larger instrument, and gives just as good an illumination, only the disc of light is smaller. It is arranged for attachment to the student lamp, as seen in the illustration, but can be very readily adjusted to a gas jet. With this instrument I have been able to perform very delicate operations within the larynx, such as cauterization, the extraction of polyps, local applications of electricity, etc.

Fig. 15.



Examination of the Larynx by means of Tobold's Pocket Illuminator. (After Tobold.)

Auto-Laryngoscopy—Examination of one's own larynx.—It is highly necessary for those who determine to attain considerable skill in the practice of laryngoscopy, to acquire the facility of examining their own laryngeal parts. This is not so much an aid in learning how to manipulate upon patients, as represented in many articles on the subject; for, whatever method may be employed, the movement required to introduce an instrument into one's own throat is entirely different from that employed in inserting it into the throat of another; besides which, we shall rarely encounter a patient who will have control over his head, or over his laryngeal and pharyngeal structures, equal to that acquired by an auto-laryngoscopist. It is rarely, too, that one will be able to demonstrate readily upon a patient all that he can observe in his own person; for the patient has not the practice of the auto-laryngoscopist, nor the same interest in it; while, in addition, his organs are seldom in a state of complete normalism, or he would have no occasion to consult the practitioner.

Many auto-laryngoscopists have acquired the power of exhibiting their larynges and contents to a wonderful extent. By reason of continued practice, the involuntary muscles move intuitively in obedience to the will, while the operator as intuitively retracts his neck or elongates it, and performs various other movements which would be absolutely impossible in a patient without long training. He who would attain skill in examination of patients must therefore commence at once upon a second person, as soon as he has mastered the regional anatomy of the parts concerned, and has had some preliminary practice on the cadaver, a model, or an excised larynx enclosed in a box, or attached to a skull. Two or more individuals studying this art together can alternate for each other as patient and physician.

But auto-laryngoscopy is of immense value to the science of the subject, in enabling us to observe the effects, natural and acquired, upon the organs depicted, of various normal and abnormal physiological efforts, such as variations in respiration, intonation, vocalization, and cantation; the phenomena of sighing, coughing, retching, and deglutition, etc., as well as the study of the muscular movements necessary to bring into clearer view any particular portion of structure. For such investigation the inquirer will find no more submissive patient than himself.

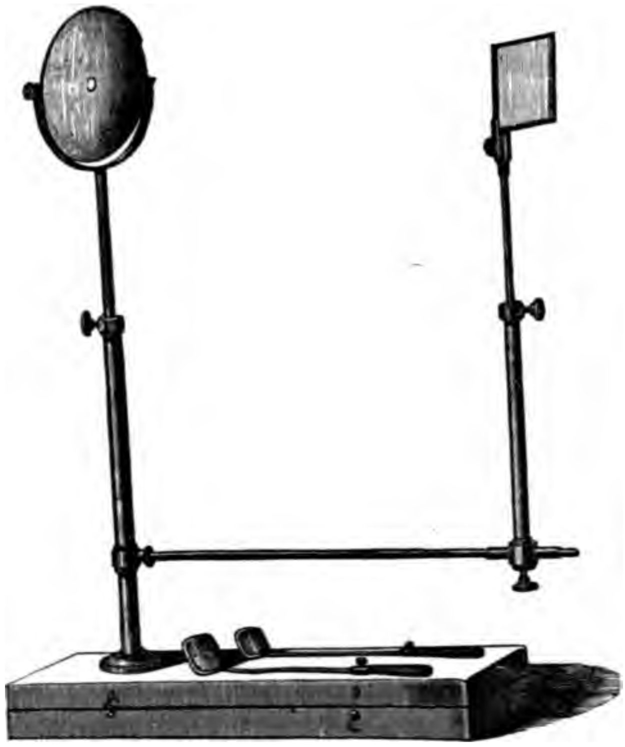
Several modes of auto-laryngoscopy may be adopted. The mode usually employed by the writer is to take the seat ordinarily occupied by the patient, and holding a hand-mirror so that its margin shall be either below the reflector or at one side of it, to direct the light into his mouth and introduce the mirror with the disengaged hand, when the image is at once seen in the hand-mirror. This method is simple and convenient for a mere examination; but if it is desired to introduce an instrument into one's own larynx, it would be necessary to have the looking-glass supported in the proper position, so that both hands could be employed with instruments. In this way three or four persons, standing in front of the auto-laryngoscopist, behind the mirror in his hand, can look past it at the image in the laryngeal mirror, while those standing behind him will see the image with him in the hand-mirror. Of course it will be understood without explanation that the differing angles of reflection and vision will prevent all the observers from seeing precisely the same image. Attention is called to the fact that, notwithstanding the laryngeal image receives in auto-laryngoscopy a second reflection before it can meet the eye of the observer, and on that account must be somewhat less distinct than the image observed in the laryngoscopic mirror itself, the auto-laryngoscopist does not use the perforation of his reflector; but this is placed a considerable distance in front of him, and the light by which the image is conducted to his eye is first reflected upon the hand-glass from the laryngeal mirror, not only at quite a distance from his eye, but totally removed from direct vision and hidden deep in the cavity of the mouth. This is a strong ocular demonstration that there is no necessity for a perforated reflector. With a perforated reflector before his eye in this method of auto-laryngoscopy, the observer could not obtain a distinct view of the image at all. With the light at the side of the mirror in which the observer is to see the image of his own larynx, so that its rays fall upon a reflector attached to the head, there is some difference, but he will find looking through the perforation satisfactorily an exceedingly difficult matter.

The method of auto-laryngoscopy practised by Czermak is as follows: The reflector is placed upon a stand eighteen or twenty inches in front of the observer's mouth. A quadrilateral mirror, also mounted on a stand, is placed a foot nearer, but in such a manner that its upper edge is about level with the lower edge of the reflector behind (Fig. 16). The flame of the lamp having been placed near the quadrilateral mirror, the observer throws the light into his mouth with the reflector, and, having introduced the laryngeal mirror, sees the image in the quadrilateral one. Previous to his adaptation of the ophthalmoscopic reflector, Czermak performed auto-laryngoscopy by direct light in front of the mouth, holding a plane mirror in such way that the light should pass beneath the mirror and between the hands into the pharynx.

With sunlight the auto-laryngoscopy can be made with the reflector or without it, according to circumstances or convenience.

An ingenious method of auto-laryngoscopy, teaching the observer at the same time the proper management of the light and of the frontal reflector in the examination of patients, has been introduced by Dr. George Johnson. His own description, copied from the London *Lancet* for August, 1864, is as follows:

FIG. 16.



Czermak's auto-laryngoscopic apparatus (after Czermak).

"One of the most useful means of acquiring skill and confidence in the examination of the larynx is the practice of auto-laryngoscopy—that is, the examination of one's own larynx. Various methods of auto-laryngoscopy have been proposed and practised. The simplest and most satisfactory plan is one which is very easy of execution, and which requires no special apparatus. The concave reflector on the forehead, and the laryngeal mirror which is used in the examination of others, with a common looking-glass and a lamp, constitute the whole of the apparatus. The method of operating is this: Sitting at a table of convenient height, I place a looking-glass at a distance of about eighteen inches in front of me, and a moderator or gas-lamp on one side of the glass, but two or three inches further back, so that the light may not pass directly from the lamp to the mirror. Now, with the reflector on my forehead, I direct the mirror, as it were, into the open mouth of my own image in the looking-glass; then introducing the laryngeal mirror into my mouth, I see the reflection of my larynx and trachea in the glass before me, and any one looking over my head or shoulder can see the image at the same time. This method, therefore, serves for auto-laryngoscopy and for demonstration; in other words, the experimenter can, by this means, see his own larynx and show it to others.

"This method certainly possesses some advantage over that employed by Czermak. In the first place, Czermak's plan requires a special apparatus, which is too complicated and costly to allow of its coming into general use. Although I possess Czermak's instrument for auto-laryngoscopy, I have quite ceased to use it, because I find the other plan easier and more satisfactory. I find, for instance, while I am holding the laryngeal mirror with my right hand, and changing the position of my head so as to obtain different views of the larynx, I can with the greatest readiness make any required change in the direction of the light by adjusting the frontal reflector with my left hand. This adjustment of the light cannot so readily be made with Czermak's apparatus, on account of the distance at which the reflector is fixed on a brass stem opposite the experimenter.

"For beginners in the art of laryngoscopy, this method affords a very useful means of training and practice. One of the chief difficulties at first is to keep a steady light in the patient's mouth while the laryngeal mirror is being introduced. Now the student, after arranging his looking-glass and his lamp, may direct the light from the frontal reflector into his own open mouth in the looking-glass. This process differs scarcely at all from that which he will have to practise on his patients. Then, having learned to keep the light steady, he may practise the introduction of the faucial mirror, and he will soon see the interior of his own larynx and trachea. I have seen several of my medical friends and pupils succeed in doing all this within less than half an hour of their first attempt.

"It is important to observe that, in practising this method of auto-laryngoscopy, both eyes may be protected from the glare of the lamp. The lamp is most constantly placed by the side of the glass to the left of the operator. The right eye is then shaded by the lower margin of the reflector on the forehead, and the left eye may readily be shaded by one or two fingers of the left hand placed at the edge of the reflector. The fingers thus placed serve at once as a shade for the left eye, and a means of moving the reflector when the direction of the light has to be changed. If the experimenter desires to show his larynx to several persons at once, he can readily do this by having the mirror in front of him of small size, about three inches square, and fixed at a convenient height; the small flat mirror belonging to Czermak's auto-laryngoscopic apparatus may be used for this purpose. Thus, while two or three persons standing behind him can see the reflection of his larynx in the glass, two or three others standing in front of him, and looking over the top and by the sides of the glass into his mouth, may see the direct reflection of the larynx from the faucial mirror."

It must be remembered that in this method of Dr. Johnson the image is not quite as distinct as in the other methods described, because the rays of light do not pass to the laryngoscopic mirror directly from the reflector, but are reflected from the looking-glass in which the image is seen, and upon which the light is directed by the reflector.

Demonstro-Laryngoscopy.—The Exhibition of a Patient's Larynx to others.—The examiner has frequently occasion to exhibit the condition of a patient's larynx to one or more persons, either for purposes of consultation or for those of demonstration. This is demonstrative laryngoscopy, and has been termed by Dr. Morell Mackenzie, of London, recipro-laryngoscopy. It is often quite difficult of satisfactory execution.

A second person—and the difficulty is obviously increased as the number of observers becomes more numerous—in order to see the image which the first observer is examining, must look by the side of the observer's head, or over his shoulder; consequently, his angle of vision being different, he cannot see the relations of the image exactly as they are being described to him; and the operator, in moving his own head a little aside in order to afford this second observer a better view, can hardly avoid changing the position of the mirror a little, and it will then reflect parts which are not being designedly demonstrated, while other parts of the structures will be entirely beyond the field of reflection.

To overcome this difficulty, and learn how to manage the mirror and one's head, so that those about the observer can be enabled to see distinctly the image of any particular portion of the parts which it is desired to demonstrate, requires a great deal of practice, and often, in addition, peculiar capabilities; for, owing to a law of physics, from the narration of which, to borrow the expressive phrase of Semeleder, "we will spare the reader," the second observer cannot simultaneously with the demonstrator see the whole of the image which is being explained to him.

It must also be remembered in making a laryngoscopic demonstration that, as with the beginner's early use of the microscope, persons unaccustomed to the employment of the laryngoscope, and not sufficiently familiar with the regional anatomy of the larynx so as to know the character of normal image that should be perceived in the different portions of the mirror, will fail to recognize all that is pointed out to them, although it may be distinctly visible. Experience in viewing laryngeal images is therefore highly necessary before abnormal alterations and pathological conditions can be detected.

Demonstro-laryngoscopy rarely affords as satisfactory a demonstration as auto-laryngoscopy, because the larynx of a patient cannot be brought under that amount of control which the auto-laryngoscopist's self-interest prompts him to acquire; besides which, in a patient, the normal relations of the part may have become so altered by disease as to render a satisfactory demonstration impossible to those themselves unable to handle the laryngoscopic mirror with the skill of an expert.

The writer finds placing a hand-mirror in the grasp of a patient a good method of demonstro-laryngoscopy; and also placing a toilet-mirror by his own side at the proper height. Then, several individuals standing behind the patient, can see the image he himself sees in the mirror in his hand, while others, looking past his head or over his shoulders, can see the image in the toilet-mirror. In the office of the writer, the examining table is placed directly in front of a book-case in whose doors are panelled mirrors. The observer sitting in front of these mirrors, his back towards them, the examination is conducted in the method previously described, and several standing at either side of him see the direct image, while a number standing behind the patient see the reflected operation in the mirrors of the book-case; in viewing which, the parts being twice reflected, are not seen reversed as in viewing the direct image. If, in addition, a mirror is placed by the patient's side, and another in his hand, a still larger class can witness the same demonstration. In addition to all this, if one of a third party of two, three, or four, standing on the left side of the patient, at whose right is stationed the illuminating apparatus, take in his hand a large laryngoscopic mirror and hold it obliquely before the patient's mouth, on his right side, in such way that it receives light reflected from the laryngoscopic mirror within the mouth, he too, and two or three at his side, can see the laryngeal image distinctly, without interfering with the other observers. In this way a demonstration can be made at the same time to quite a large class. The extra-laryngoscopic mirror intended to be held obliquely in front of the patient's mouth may be permanently attached to the illuminating apparatus by means of a little arm similar to the attachment of Tobold's reflector. As this mirror, too, will become dimmed by the halitus of the breath when held quite near the mouth, it must be heated or otherwise prepared, to prevent condensation of moisture on its surface. When held by the hand from the opposite side, the stem must be placed undermost, so that it be out of the way of the first laryngoscopic mirror, and beneath it when the latter has been passed to the pharynx.

To a teacher of laryngoscopy, the employment of the second laryngoscopic mirror in this way will enable him to watch and direct the movements of a pupil much more accurately and satisfactorily than by any other method with which the writer is acquainted; while at the same time he will see a similar image to that which is being examined in the mirror in the mouth, and be entirely out of the way of the operator's movements.

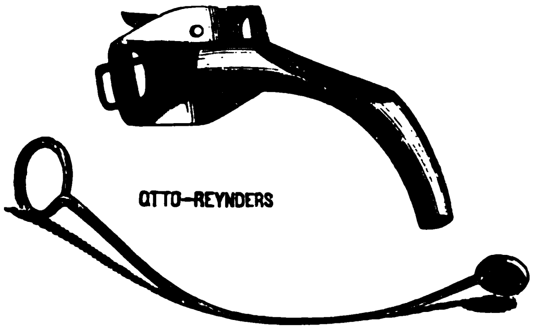
Dr. Smyly, of Dublin, has contrived an apparatus for demonstrating to others the larynx of a patient. He uses one of Weiss's frontal bands to which is attached by a split tube a perforated reflector that is placed over one eye. Attached by a second split tube to a brass rod bent at an angle of 45° is a small square plane glass mirror set in brass, that is placed in front of the other eye; and those observers standing behind the patient see the reflected image in this square mirror. This apparatus is somewhat clumsy and awkward for the operator, necessitating considerable familiarity with its use for its satisfactory employment.

Infra-Glottic Laryngoscopy, or Tracheoscopy.—Tracheal Laryngoscopy.—Examination through a wound in the Trachea or Larynx.—Dr. Neudörfer (*Wiener Zeitschrift für prakt. Heilkunde*, Nov. 12, 1858) was the first to conceive the idea of examining the laryngeal and tracheal structures by means of a mirror passed through the wound left after laryngotomy or tracheotomy, and demonstrated its possibility on the cadaver. Fortune very appropriately favored Czermak, the great promoter of this whole art, who soon after, early in 1859, proved the practicability of this method of examination upon the person of a living patient. Von Bruns, of Tübingen, followed in March of the same year, since which time the records of many cases have been published.

In this manner the deeper structures of the trachea can be more minutely explored, and inspection be obtained of the lower surface of the vocal cords—an examination otherwise impracticable. This method is, of course, of very limited application, from paucity of subjects; but in the laryngeal or tracheal troubles of patients whose parts have been opened, it affords an addition to our means of diagnosis of which we are bound to avail ourselves. It very often happens that pathological changes following suicidal wounds, or the operation of tracheotomy or laryngotomy, will prevent by tumefaction, or contraction from cicatrization, the possibility of obtaining a good view into the parts from above, and consequently prevent a strictly local application to any desired spot. Under such circumstances we have the advantage presented of being enabled to introduce instruments under sight, through the external opening.

The presence of the ordinary curved tracheotomy tube will prevent this examination. The introduction of a canule with a long fenestrum in its upper surface will permit the introduction of a mirror; or a short, plain, straight tube may be employed; or the edges of the wound may be kept apart by a two-leaved ear speculum, or by hooks attached to a ribbon passing round the back of the neck from one side to the other. The best mirrors for an examination of this kind are those made of thin plates of polished steel; because, as they are necessarily exceedingly small, we thereby avoid the loss of reflecting surface which would be caused by even a narrow setting. The shape of the mirror may be round or oval. The stem of the mirror must curve strongly downwards from its reflecting surface, so that when introduced within the tube, the handle will be considerably below the opening in the structures. Fig. 17 represents Tobold's appliances for infra-glottic laryngoscopy. The best

FIG. 17.



Tobold's perforated canula, and small metallic mirror for infra-glottic laryngoscopy (after Tobold).

results are obtained by direct sunlight; and when artificial light is employed it must be reflected horizontally through the axis of the wound to the posterior wall of the tube. As the mirror dims much more quickly than when held in the pharynx, and heating it in the ordinary mode would necessite its almost momentary removal, it is best to protect its surface by spreading over it a delicate layer of gum-water, sugar and water, glycerine, or dissolved caoutchouc. It must be expected to find respiration impeded by the presence of the mirror in the respiratory tube. There is great irritability of the structures from the contact of a foreign body, which renders the operation by no means an easy one; besides which, difficulties will often be encountered from pathological changes which may have followed the surgical operation.

In this manner we can examine the lower surface of the true vocal cords; the posterior wall of the larynx and trachea; the lower attachment of the epiglottis, and its laryngeal surface from the point of insertion all the way to its free border; and the anterior face of the arytenoid cartilages;—light being thrown through the glottis, when opened, clear on to the pharynx and velum.

In the ordinary laryngoscopic examination we see the vocal cords of a pearly white color. In infra-glottic laryngoscopy we find the lower surface of these cords to be reddish in color, as is the whole mucous membrane of the larynx; so that sometimes the cords can be recognized as such only by their movements.

Dr. Semeleder, of Vienna, has reported[1] a series of auto-infra-glottic examinations observed by a medical gentleman. "A physician from abroad was taken sick with typhus, which led to perichondritis laryngea; after laryngotomy and the discharge of a piece of necrosed cartilage, he was so far cured that he could attend to his business; but he was obliged to wear the canula for an indefinite period. He was often examined by the laryngoscopists of Vienna; but a view of the glottis from above was impossible, and even the apices of the arytenoid cartilages were seen very imperfectly and with much difficulty, from the decided and unyielding depression of the epiglottis; nor could the glottis be seen from below, as a fold of œdematous and inflamed mucous membrane closed up the window of the canula. After the repeated removal of small portions, and frequent cauterizations, it was finally determined to leave this fold to itself; after a while it vanished, and the glottis could then be seen from below in its whole extent, manifestly constricted, but still quite movable. By an application of Czermak's self-observing apparatus, so that the cone of light should fall above the laryngeal mirror, it was possible for the patient himself to examine the glottis from below. This patient also gave occasion to numerous improvements and alterations of the canula, so that it was adapted to use in speaking."

---

[1] *Rhinoscopy and Laryngoscopy;* Caswell's translation, p. 96.

ŒSOPHAGOSCOPY.

It was very natural that the success attending the examination of the larynx should have suggested the feasibility of examining the œsophagus; and attempts have been made accordingly in this direction, and with a certain amount of success, by Lewin of Berlin, Semeleder of Vienna, Voltolini of Breslau, Waldenberg,[1] and others.

There are great anatomical obstacles to the performance of œsophagoscopy. The larynx and trachea, being cartilaginous in structure, are open tubes; the œsophagus, on the contrary, is a flaccid tube, opened only when an object is presented for entrance; and in making a laryngoscopic examination, its opening, or rather place of opening, is seen in the laryngoscopic mirror as a transverse groove or furrow beneath the arytenoid cartilages at the place of junction of the cricoid. In addition to the laryngoscopic mirror, it becomes therefore necessary to dilate the tube with a speculum or appropriate forceps, an operation at once suggestive of complication and difficulty. The best description of this manipulation is that of Semeleder,[2] who has not only practised it upon patients, but has also made a series of instructive experiments upon himself in the presence of distinguished laryngoscopists, for the purpose of demonstrating the value of the operation and studying it thoroughly. It is said to be perfectly feasible, after more or less effort, to explore an inch or two of the œsophagus; and one or two cases are on record in which, examination being made after inserting a stomach-tube of proper dimensions, light was thrown down its entire extent, so as to reveal the condition at the cardiac orifice of the stomach. The author has had no experience in this manœuvre.

---

[1] *Berlin. Klin. Woch.*, vii. 48; *Schmidt's Jahrb.*, cxlix., p. 214.
[2] *Rhinoscopy and Laryngoscopy*; Caswell's translation, p. 97.

REGIONAL ANATOMY OF THE LARYNX.

Before entering upon the detailed study of the image perceived in the laryngeal mirror, it will be advisable to advert in succinct terms to the regional anatomy of the component structures, in order that the subsequent elucidation be rendered more satisfactory and comprehensive.

The trachea is surmounted by a stout ring-shaped cartilage, the *cricoid*, which may be viewed as the base supporting the laryngeal fabric. Articulated at its sides by capsular ligaments with the lower horns of the thyroid, it is clasped as it were by that cartilage, to the lower border of which it is further attached anteriorly by a peculiar elastic membrane—part of the vocal membrane here forming the middle crico-thyroid ligament—and laterally by ordinary ligament, and muscle. Surmounting the cricoid behind, and articulated to it by loose capsular ligaments, are two three-sided pyramidal cartilages, the *arytenoids*, separated from each other by a fissure known as the inter-arytenoid incisure. On top of these arytenoids, and serving to prolong them inwards and backwards, are the cartilages of Santorini, and at the side of their articulation, occasionally (Luschka), a sesamoid cartilage. Directly opposite the arytenoids, and attached by ligament to the inner surface of the upper portion of the angle formed by the junction of the wings of the thyroid (the inner surface of the pomum Adami), there is suspended a leaf-like cartilage, the *epiglottis*, overlooking the entrance into the larynx like a trap-door, which it is. The greater extent of this cartilage anteriorly is closely connected by ligament from below upwards, to the thyroid cartilage, the hyoid bone, and to the root of the tongue, above the base of which its free broad extremity projects. From each side of this epiglottis as it tapers down to its pedicle of attachment to the rentrant angle of the thyroid in which it is confined, there stretches an elastic membranous structure, continuous with the middle crico-thyroid ligament and covered by mucous membrane, and which, ensheathing in its course various ligaments, muscles, and cartilages, is attached behind to the arytenoid of that side, and below to the superior border of the side of the cricoid; presenting, therefore, an expanded unattached surface exteriorly and interiorly, and leaving a free space or pouch between its outer surface and the inner face of each wing of the thyroid. This free guttered space, continuous with the pharynx, which slopes down to the entrance into the œsophagus, has much the shape of a long three-sided pyramid, the base above, the apex below, one face behind and the angle in front, and from its shape is known as the pyramidal or pyriform sinus; anatomically, the laryngo-pharyngeal or lateral pharyngeal sulcus, sinus, or fossa.

This membranous expansion on each side, with the epiglottis in front, and the arytenoid and the supra-arytenoid cartilages, with their connecting muscle and mucous membrane, constitutes the encircling boundary of the upper laryngeal cavity; so that from one thyroid plate to the other there are three distinct spaces, the central one being the entrance proper into the larynx, and each lateral one a pyriform sinus tapering down to the œsophagus. All that portion of this elastic mucous membrane above the middle crico-thyroid ligament, being irregularly quadrilateral in shape, is called the quadrangular membrane, and its superior margin is known as the aryteno-epiglottic (or, for short, *ary-epiglottic*) fold, which is considered by some anatomists to consist at least in part of ligament tissue. Near its attachment to the apex of the arytenoid cartilage, this fold encloses a small elongated staff-like cartilaginous nodule, the cuneiform cartilage or cartilage of Wrisberg, rudimental and occasionally absent in the white, larger and said to be constant in the negro.

Thus the superior aperture of the larynx presents a cordiform outline descending an inclined plane, wide in front and sloping obliquely downwards, backwards, and inwards, to terminate in the narrow fissure separating the two arytenoid cartilages.

In the interior of the larynx, the elastic membrane with its mucous covering, as it reaches the petiolus of the epiglottis, makes an attachment on each side, in front to the rentrant angle of the thyroid and behind to a tubercle on the anterior and inner face of the arytenoid; then rolls outwards on itself its whole length from one point of attachment to the other, forming a thick fold with crescentic margin; which is the *ventricular band,*[1] and constitutes the roof of the ventricle of the larynx. This duplicature is continued up anteriorly into a pouch or sac existing between the two reflected layers of the quadrangular membrane, running up often as high as the superior border of the thyroid cartilage and sometimes higher, becoming conical and turning backwards in the form of a Phrygian casque, as graphically described by Cruveilhier; and then, descending the opposite wall of the sac, passes the reflected border which is called the ventricular band, and immediately below this point is reflected horizontally inwards over the narrow inferior thyro-arytenoid ligament or true vocal cord, a stout fibrous band extending from the rentrant angle of the thyroid where it coalesces as it were into a cartilaginous prominence, the anterior vocal process, just below the point of attachment of the ventricular band, to be attached behind in coalescence with a similar cartilaginous protrusion, the posterior vocal process, to the anterior angle of the base of the arytenoid cartilage; then the elastic membrane on the inferior face of this true vocal cord is continuous with the middle crico-thyroid ligament; after which the mucous membrane continues its descent, and courses down the windpipe, etc.

Thus there is formed on each side in the interior of the larynx, about half an inch below its superior border, a narrow elliptical space separating the true and false vocal cords. This is the ventricle of Morgagni or of Galen, and is the vestibule of communication between the laryngeal pouch and the main cavity of the larynx.

---

[1] I would prefer to substitute for the objectionable terms *true and false cords* the phrases *ventricular folds* and *vocal laminæ*, as more descriptively suggestive.

The existence of the *elastic membrane of the larynx*, or vocal membrane as it is now more appropriately termed, and which determines the configuration of the vocal apparatus, was first described by Lauth in 1835, and his description was subsequently confirmed by the dissections of Tourtual, Merkel, Luschka, and others. Its existence was independently discovered in this country by Dr. Leidy, Prof. of Anatomy in the University of Penn., who in 1848 made it the subject of an article published in the *American Journal of the Medical Sciences*. The membrane can be distinctly traced continuous with the middle crico-thyroid ligament along the inferior surface of the true vocal cord; but above this point it becomes very attenuated and is traced with difficulty.

The articulation of the lower horns of the thyroid to the sides of the cricoid permits a certain amount of movement on its horizontal axis. The ball and socket articulation of the arytenoids upon the cricoid permits very free movement forwards and backwards, outwards and inwards, and to a certain extent rotarily. These arytenoidal movements can be beautifully demonstrated by means of the laryngoscope, and the vocal cords, being attached to these cartilages, participate in their movements.

EXAMINATION OF THE LARYNGEAL IMAGE IN DETAIL.

The most prominent structure attracting attention in the laryngeal image will be the epiglottis, whose free portion projecting stiffly forwards from behind the base of the tongue renders it readily recognized. In the upper part of the mirror and behind, we recognize the under surface of the posterior palatine arches terminating in the lateral walls of the pharynx; and in front of the tonsil, the anterior palatine arches terminating in the sides of the base of the tongue, of whose posterior surface with its papillæ, more or less is visible according to the obliquity of the mirror. Directing our attention to the epiglottis we recognize an anterior and posterior surface, and an upper arching crest, frequently indented, continuing down in lateral borders from which is given off on either side a pharyngo-epiglottic fold of mucous membrane arching upwards and forwards to join the posterior palatine arch as it terminates in the lateral pharyngeal wall. As this fold leaves the epiglottis we distinguish another fold leaving the same point at nearly right angles and stretching curvilinearly backwards to the arytenoid cartilages. This is the ary-epiglottic fold forming the superior free border of the quadrangular membrane of the larynx. The anterior surface of the projecting portion of the epiglottis is seen to be slightly concave from above downwards, and strongly convex from side to side; while its posterior surface is concave and convex in the opposite directions. As we gain a more complete and extended view of this posterior or laryngeal face of the epiglottis we notice that it swells out more or less abruptly into a considerable belly or pad, which tapers down to its point of attachment, and which, in the process of swallowing, etc., becomes pressed down, like the pad of a truss, upon the ventricular bands. This is the tubercle of the epiglottis, inelegantly termed the "cushion of the epiglottis," and is formed chiefly by an aggregation of small glands and adipose tissue. It very often projects sufficiently to cut off the view of the anterior portions of the vocal cords attached to the thyroidal junction below.

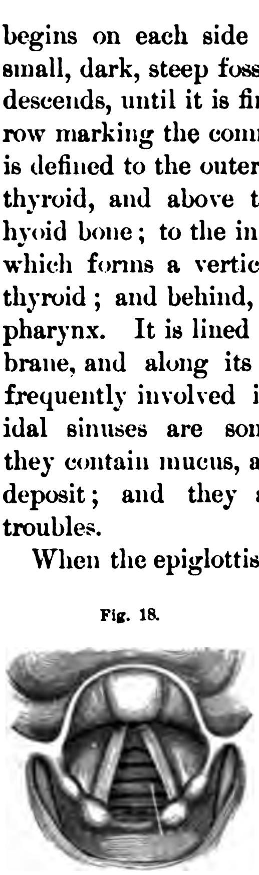
From the anterior and lingual face of the epiglottis, directly in the middle line, is stretched a small sharp bordered membranous fold continued to the base of the tongue, joining the raphe of that organ as though the two might be continuous. This is the glosso-epiglottic fold, or posterior frænum of the tongue, or frænum of the epiglottis; and it encloses the glosso-epiglottic ligament, the bridle rein forcing the epiglottis to participate in the movements of the tongue. Some muscular fibres from the tongue can sometimes be traced in this frænum, which in some lower animals encloses a pair of muscles. To each side of this fold, which is strongly raised when the tongue is thrust forcibly forwards, there is seen an indentation, sometimes shallow, oftener deeply depressed, presenting in shape and size very much such an appearance as would remain moulded in plastic material after moderate pressure from the tip of the finger. These are the *lingual sinuses*, the glosso-epiglottic fossæ or sinuses, the valleculæ of Tourtual. When shallow they gradually become lost in the lateral border of the tongue, but more frequently they are strongly depressed at the frænal outline, and becoming less deeply marked to either side are bounded exteriorly by a sharp fold of the mucous membrane of the side of the tongue, then called the lateral glosso-epiglottic fold. These lateral folds enclose no ligament, and though generally described as existing post-mortem, are very frequently absent in the living organ (first laryngoscopically demonstrated by Merkel); and it is affirmed by Luschka that when existing they join the sides of the pharynx, an anterior leaflet only being continuous with the mucous membrane of the tongue. As first stated by Von Bruns, in the floor of these sinuses we are sometimes able with the laryngoscope to discern the position of the root of the greater horn of the hyoid bone, which appears as a clear longish oval projection behind and stretching outwards. These lingual sinuses often afford lodgments for articles of food, pins, tacks, and other foreign bodies, and are very frequently attacked by disease. Dr. Horace Green, of New York, expressed the opinion that *tuberculous degeneration often commences here*, and Lewin of Berlin has reported cases of scrofulous degeneration and syphilitic ulceration of these sinuses. Dr. Elsberg of New York, and others have placed on record cases in which long-continued throat disease had resisted topical applications to the larynx, disease which the laryngoscope revealed to be ulceration of these sinuses, soon healed by intelligent local treatment.

The height of the projecting portion of the epiglottis will be found to vary, with the size, age, and sex of the individual, from three or four lines to an inch, the average in the adult male being rather more than half an inch; and when erect, part of its laryngeal face will often curl over and present outwards. Its color is a light red veiling a yellowish white, being less pronounced at its edge where the color of the cartilage is more distinct, much like the color of the conjunctival membrane of the eyelid, to which it was likened by Störk. Posteriorly the red deepens; and the pad appears quite red. By artificial light the parts will have a deeper color than by sunlight, which must be borne in mind lest the diagnosis of congestion be improperly pronounced. The thickness of the epiglottis will vary from a sharp thin edge, hardly a line, to a thick stump of several lines; and when swollen it may be as thick as the finger. It is very variable, too, in shape; sometimes it is long, narrow, and pointed; sometimes very broad and short; sometimes very little curled; sometimes the sides roll in together posteriorly until they nearly touch; sometimes it is curled inwards with a contraction in the middle, which Türck has likened to the sides of a jew's-harp. All this must be remembered, or congenital irregularities may be diagnosed as alterations in form. Usually it is quite stiff; sometimes it is flaccid. It is sometimes quite erect, meeting the plane of the tongue at a right angle; sometimes its lingual face will be pressed back upon the base of the tongue; ordinarily it will be found to overlook the laryngeal entrance at an angle of from 40° to 60°, but it is sometimes much more depressed backwards, so that it may shut off a view into the larynx—and all this congenitally. When the tongue remains at rest upon the floor of the mouth or is only slightly protruded, its base presses the epiglottis over the laryngeal aperture, and then the free upper border of the cartilage will usually appear as a narrow band or stripe more or less arched.

The posterior wall of the pharynx appears beyond the laryngeal structures in the lower portion of the mirror, as a smooth glistening surface, sometimes striated in appearance, of an ashy-red color, and presenting here and there small rounded or oval elevations, which are enlarged follicles; and in some positions of the mirror it can be seen its entire length, so that in the lowest part of the mirror and behind, about the position of the cricoid cartilage, we observe the posterior mucous surface of the larynx closely applied to the mucous membrane of the pharynx, affording no distinctive evidence of the opening into the œsophagus, other than a slightly arched transverse furrow marking, by a dark line, its point of commencement.

Outside the ary-epiglottic fold, between it and the inner face of the thyroid, we see the triangular *pyramidal sinus*, which begins on each side of the free border of the epiglottis as a small, dark, steep fossa, becoming more and more conical as it descends, until it is finally lost at one end of the transverse furrow marking the commencement of the œsophagus. The wall is defined to the outer side by the inner face of the plate of the thyroid, and above this the hyo-thyroid membrane and the hyoid bone; to the inner side, by the quadrangular membrane, which forms a vertical angle anteriorly with the wing of the thyroid; and behind, it is bounded by the posterior wall of the pharynx. It is lined by the common pharyngeal mucous membrane, and along its angular floor there is a chain of glands frequently involved in disease of these parts. These pyramidal sinuses are sometimes seen entirely clean, sometimes they contain mucus, and sometimes appear to contain a cheesy deposit; and they are frequently involved in pharyngeal troubles.

Fig. 18.



Normal larynx during inspiration.

When the epiglottis is well raised (Fig. 18), we gain a view of the whole circumference of the superior laryngeal aperture. This is triangular, somewhat cordiform, wider in front than behind, sloping down obliquely backwards, and terminating behind in the vertical inter-arytenoidal fissure. Its border is formed in front by the free rim of the epiglottis; then, on either side, by the ary-epiglottic fold, which arches backwards in the form of a bow until it reaches its arytenoidal attachment posteriorly, where it surrounds a rounded eminence, the cartilage of Santorini; and the two arytenoids, with their connecting muscle and mucous fold, complete the border behind. An enlargement on each side in front of the cartilages of Santorini, and breaking the arch of the ary-epiglottic fold into two unequal festoons, is produced by the enclosed extremity of the staff-like cartilage of Wrisberg surrounded with glands and adipose tissue.

A reflection of mucous membrane runs from one arytenoid cartilage to the other, which, during ordinary respiration, can be distinctly seen forming the posterior boundary of this superior portion of the larynx; but during vocalization the contraction of the arytenoid muscle approximates the cartilages, and the band of mucous membrane folds up, exposing the vertical fissure. The obliquity of this border renders the thyroidal wall of the larynx much deeper than the arytenoidal. Dr. Elsberg, of New York, writes, that in this posterior wall he has detected the presence of tubercles long before the ordinary physical signs of phthisis could be recognized, and that after-results verified this early prognosis. Czermak, Störk, Lewin, and others have recorded similar observations.

If we look down along the inner or laryngeal face of the quadrangular membrane, we will see on either side, about half an inch below its superior border, the red mucous membrane folding under on itself, forming the ventricular band *or false vocal cord*, a broad mucous fold, and leaving between it and the horizontal surface of the true vocal cord, seen immediately below as a white, glistening band extending from before backwards, an oblong interval, which is the ventricle of the larynx, and which leads up into the laryngeal sac. By means of a deep inspiration, especially if short, sudden, and following vocalization, these ventricles can be rendered more distinct, and a separation of their walls be observed dilating the cavity. The size of the ventricles, or rather the space constituting them, varies. It is contended by some anatomists, that these ventricular bands are not merely duplicatures of mucous, or of mucous and elastic membrane, but that they are composed in part of ligamentous tissue (superior thyro-arytenoid ligament) and some muscular fibre. It is generally conceded that they contain a delicate narrow band of fibrous tissue continuous with the fibrous capsule of the laryngeal sac, but destitute of muscular fibre. There is no doubt, however, that they occasionally approximate in voluntary contractions of the larynx; I have sometimes seen them come close together and cut off the view of the vocal cords so gracefully that it was almost impossible to resist the idea that the action was indeed due to muscular tissue in their proper substance. In the mucous membrane of the sac there open, as first described by Hilton, some sixty or more small follicular glands, situated in the submucous connective tissue. Its laryngeal surface is covered by the inferior portion of the aryteno-epiglottideus muscle (compressor sacculi laryngis of Hilton) which compresses the sac and discharges its secretions upon the true vocal cords, which, being themselves unprovided with glands, are thus lubricated.

The floor of the ventricle is formed by the true *vocal cord*, which is easily recognized by its semi-metallic lustre—a mother-of-pearly white in the female, with a yellowish dash in the male; a strong, thick, fibrous-looking band (the inferior thyro-arytenoid). The sharp edge of this band constitutes the vocal cord par excellence. This structure, at least its lower surface, is an extension inwards of the vocal membrane, or the middle crico-thyroid ligament. Each cord consists of a compact band of parallel fibres of elastic and fibrous tissue, arranged in prismatic form, the base being outwards, so that a vertical section shows the upper surface horizontal, and the lower surface taking an oblique direction downwards and outwards. Firmly imbedded into the external portion of the vocal cords are some short pennated fibres from the vocal muscle, the thyro-arytenoid, which is adherent and parallel to it, attached in front to the receding angle of the thyroid, and behind to the arytenoid. When the two true vocal cords are approximated, their horizontal surface forms a floor to the upper laryngeal cavity. They form with the space between their free edges *the glottis* ; their sharp borders are *the lips of the glottis*, and the chink or fissure between these lips is the *rima glottidis*. These terms should not be confounded. The length of the rima in the male varies from ten to thirteen lines; in the female, from seven to ten lines; in children it is much less: and, when dilated, the space across will vary ordinarily from three to six lines; but when widely dilated by a deep inspiration, it may be from six to ten lines, leaving a space large enough often to admit a good-sized finger. The rima of the glottis is not formed by the vocal cords alone, but also by the inner face of the arytenoids posterior to the points of attachment of the cords; so that we speak of an inter-ligamentous rima corresponding to the length of the cords, say eight lines, and an inter-cartilaginous rima posteriorly, about three lines. Luschka is disposed to decry this division, which is due in appearance to the knuckling inwards of the posterior attachments of the cords when the posterior vocal processes converge inwards.

The form of the rima glottidis varies.—During ordinary respiration it is a narrow interval somewhat enlarged and rounded behind, looking not unlike the lozenge-shaped space formed by pressing together the tips of the two thumbs and the tips of the two fore-fingers, and then extending the thumbs rather strongly posteriorly and the fingers anteriorly, when the space separating the two thumbs will represent the inter-cartilaginous rima, and the remaining space the inter-ligamentous rima. When widely dilated, the rima acquires the form of an equilateral triangle, the base being behind. The form of the rima varies greatly during phonation, and may become elliptical, oval, or opened only anteriorly, as the cords are acted upon by the complex thyro-arytenoid muscle, with portions of which their structure is blended, and by the contraction of other muscles attached to the arytenoids.

When the epiglottis is well raised from the laryngeal aperture, as by the emission of a high musical note, so that the anterior portions of the vocal cords can be discerned, we often see below the small end of the pad of the epiglottis, immediately beneath the junction of that cartilage to the thyroid, and separating the anterior attachments of the ventricular bands, a well-marked, sharply-defined, pinhead-like pit or foramen in the mucous membrane. This is the *fovea centralis* of Merkel, and communicates directly on both sides with the anterior entrance into each laryngeal sac, being continuous below with a shallow groove formed by a short fold of the laryngeal mucous membrane which stretches across from the anterior end of one vocal cord to the other. This fovea centralis is one of the chief points of insertion for the elastic membrane. Though very small in the human subject, it is said to be quite large in many lower animals, as in the horse, where it seems to constitute a middle ventricle in the larynx.

The anterior and posterior points of insertion of the vocal cords are seen upon them as four yellow spots, the *maculæ flavæ*, which mark the positions of the vocal processes.

The mucous membrane, as it passes from one arytenoid cartilage to the other, is thrown into loose folds known as the *commissure* of the arytenoids, and is best seen stretching across when the arytenoids are separated. As these cartilages approach each other, this commissure becomes folded up, as it were, within the vertical cleft or notch, the *arytenoid fissure*. often termed improperly the posterior glottis.

The special points of observation are well represented in the accompanying drawings, from Mackenzie.[1]

FIG. 19.

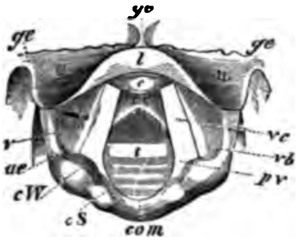


Fig. 19.—Laryngoscopic drawing, showing the vocal cords drawn widely apart, and the position of the various parts above and below the glottis, during quiet inspiration.

ge. Glosso-epiglottidean folds.
u. Upper surface of epiglottis.
l. Lip of epiglottis.
c. Cushion of epiglottis.
v. Ventricle of larynx.
ae. Ary-epiglottidean fold.
cW. Cartilage of Wrisberg.
cS. Capitulum Santorini.
com. Arytenoid commissure.
vc. Vocal cord.
vb. Ventricular band.
pv. Processus vocalis.
cr. Thyroid cartilage.
t. Cricoid cartilage, below which are seen several rings of the trachea.

FIG. 20.

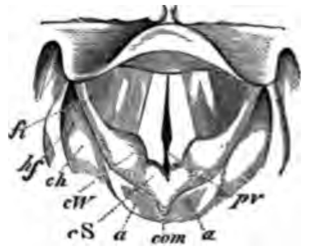


Fig. 20.—Laryngoscopic drawing, showing the approximation of the vocal cords, and the position of the various parts in the act of vocalization.

fi. Fossa innominata.
hf. Hyoid fossa.*
ch. Cornu of hyoid bone.
cW. Cartilage of Wrisberg.
cS. Capitulum Santorini.
a. Arytenoid cartilage.
com. Arytenoid commissure.
a. Arytenoid cartilage.
pr. Processus vocalis.
(In reality, during phonation the vocal cords are much closer than is shown in the drawing, the posterior vocal processes being in contact.)

* Pyriform sinus.

Under unfavorable circumstances the view is limited to a portion of the base of the tongue, the edge of the epiglottis, more or less of the arytenoid cartilages, and some portions of the posterior wall of the pharynx.

If we wish to examine the whole laryngeal face of the epiglottis and the anterior extremities of the vocal cords, we direct the patient to sound a high note quickly and with a little force, which effort raises the larynx, closes the glottis, and throws the epiglottis up with a jerk, so that the horizontal surface of the vocal cords is distinctly seen, as well as the ventricular bands and the ventricles. An inspiration accompanied by sound, or an ironical laugh, will bring the same structures in view. If this does not suffice, some of the instruments described for pulling the epiglottis forward may be employed. When a depressed epiglottis prevents a view of the cords, we may judge of their mobility by the movements of the arytenoids, which can almost always be recognized.

---

[1] The Use of the Laryngoscope.

To examine the posterior extremities of the vocal cords, the anterior surfaces of the arytenoids, the arytenoid commissure, and the inner posterior wall beneath, we reflect the light more posteriorly by inclining the mirror towards the horizon during an inspiration, which inspiration opens the glottis and separates the arytenoids, which look upwards, backwards, and outwards, exposing their anterior faces.

To examine the posterior walls of the arytenoids down to the cricoid, and obtain a good view into the pyramidal sinuses, we direct the emission of sound, so as to close the glottis; in doing which, the arytenoids approach, exposing their pharyngeal surface, separating more widely the quadrangular membranes from the plates of the thyroid.

To obtain a view farther down the trachea than is represented in the figures, we place the mirror more perpendicularly, and direct a deep inspiration, so as to open the glottis to its fullest extent, and then, by a little manipulation, reflecting the light more anteriorly, we may see several tracheal rings as narrow bands, colored like the conjunctival membrane of the eyelid, arching across with their concavities downwards, becoming narrower and closer as they are more distant, until the foreshortening is such that they cannot be distinctly counted; and sometimes in this way, when the circumstances are favorable, such as a good mirror, a steady hand, a well-directed light, a straight tracheal axis, a wide glottis, etc., we can gain a view clear down to the bifurcation of the tube. Sometimes, when we fail to obtain such an extended view with the light, patient, eye, and mirror in the ordinary position, we can succeed by elevating the position of the patient so that the eye of the observer shall be below the plane of the patient's mouth; then throwing the light from below upon the laryngoscopic mirror, which is to be held horizontally, the light can be reflected clear down the windpipe, and we can see most distinctly the increasing foreshortening of the tracheal rings; and if the bifurcation be visible, we see behind the last ring (below in the mirror), instead of the complete arch with its concavity downwards, a bright triangular space, base up, which often seems to project up into the interior of the tube, and on either side of this triangular space dark circular discs marking the commencement of the bronchiæ. If the right bronchus is very straight, sufficient light can sometimes be thrown in to demonstrate more or less of its extent.

A good rule by which to hunt for the view of the bifurcation is, to get a good view of the laryngeal face of the epiglottis, and then, with this as a guide, to continue inspection along this plane right down the anterior surface of the trachea, gradually lessening the obliquity of the mirror as we gain a deeper view.

If, when a view of the trachea has been obtained, we turn the mirror a little to one side, we obtain a lateral view of that tube resembling the turns of the thread in the nut of a screw.

THE MUSCULAR FORCES PRODUCING CHANGES IN THE FORM OF THE GLOTTIS.

Before leaving the demonstrative portion of our subject, it will be advisable to allude to the muscles moving the laryngeal structures, and to whose contractions are due the various alterations of form observed during the performance of the physiological functions of respiration and vocalization.

In the first place, there are several muscles outside of the laryngeal tube.

1. *Crico-arytenoideus posticus*, one on each side, occupies the lateral half of the posterior face of the cricoid, and runs upwards and outwards to be inserted into the exterior posterior part of the arytenoid surmounting the cricoid on that side. *Use*, to rotate the arytenoid outwards and backwards, and open the chink of the glottis. This muscle may be viewed as the ex-

tensor muscle of the respiratory glottis, opening the intercartilaginous rima, antagonizing the arytenoideus.

2. *Crico-arytenoideus lateralis*, one on each side, runs from along the superior margin of the sides of the cricoid, obliquely upwards and backwards to the outer angle of the base of the arytenoid, just in front of the insertion of the posterior crico-arytenoid. *Use*, to draw the arytenoid forwards and outwards, turning the posterior vocal processes inwards, and thus contracting the chink of the glottis in vocalization.

3. *Crico-thyroideus*, one on each side; a triangular muscle running from the anterior lateral surface of the cricoid upwards and backwards to the inferior edge of the thyroid plate, and into its inferior horn, leaving an interval between itself and fellow occupied by that portion of the vocal membrane called middle crico-thyroid ligament. *Use*, to draw the thyroid upon the cricoid with a forward rotary motion, thus stretching the vocal cords, rendering them tense and contracting the chink of the glottis.

4. Then we have behind, the *arytenoideus*, a single muscle, sometimes described as three distinct muscles. A transverse portion, the deepest, goes posteriorly from the whole length of one arytenoid to the other, covering them completely except at the very tip; over this portion two oblique portions cross each other, running respectively from the base of one arytenoid to the apex of the other. Sometimes portions of this muscle are continuous with the thyro-arytenoideus and the aryteno-epiglottideus, one or both, seeming to act in consonance with them in closing the larynx. In fact, there seems to be a guttural communication right over this muscle, with the posterior portion of the ary-epiglottic fold, leading from the ventricle of Morgagni up the inner posterior wall of the larynx and out into the pharynx behind. This gutter or drain is the *filtrum ventriculi* of Merkel, and seems intended to lead off into the pharynx any accumulating secretion from the laryngeal pouch.

The use of the *arytenoideus* is to bring the two arytenoid cartilages in close apposition, which it does very completely by means of its transverse and oblique fibres, so that the [illegible] borders of the posterior vocal processes touch each other and thus close the posterior portion of the glottis. This muscle may be viewed as the flexor of the respiratory glottis. So much for the exterior muscles of the larynx.

In the interior of the larynx we find several muscular structures enclosed within the quadrangular membrane. These are on each side:—

1. *Thyro-epiglottideus*, a delicate muscle running from the posterior inner face of the thyroid near its rentrant angle, just outside of the thyro-arytenoid, into the side of the epiglottis. *Use.*—To pull the epiglottis down. This it can do ordinarily only when the tongue is relaxed, and, for this reason, the dropping of the epiglottis is usually attributed to backward pressure from the base of the tongue relaxing the middle glotto-epiglottic ligament; but it has been shown by the laryngoscope that some persons can acquire such control over their organs as to drop the epiglottis with the tongue extended; and this would seem to confirm the ascribed use of this muscle as a true depressor.

2. *Aryteno-epiglottideus*, a still more delicate muscle, running from the superior lateral portion of the arytenoid into the side of the epiglottis, some of its fibres being lost in the ary-epiglottic fold. This muscle is indistinctly defined horizontally into what is sometimes described as a superior and an inferior muscle, the inferior portion of which (compressor sacculi laryngis, *Hilton*) compresses the laryngeal pouch and squeezes its secretion out upon the vocal cords. The superior portion will constringe the upper portion of the quadrangular membrane, and, with the thyro-epiglottic muscle, assists to close the superior laryngeal aperture.

3. *The Vocal Muscle.*—There is still another intrinsic laryngeal muscle on each side meriting a more detailed mention than that of its mere origin and insertion. This is the *thyro-arytenoideus*, lying external to the vocal cord and inseparably attached to it, from which circumstance many anatomists have considered the vocal cord but the tendon of this muscle. It is most usually described as parallel to the outer side of the cord, arising from the lower half of the rentrant angle of the thyroid cartilage and from the middle crico-thyroid ligament, and passing backwards and outwards to be inserted into the anterior and

outer face of the arytenoid and into its base; its use being to relax the vocal cords and shorten them, thus lessening the length of the chink of the glottis.

The thyro-arytenoid muscle, however, is quite complex in the arrangement of its fibres, and seems to be the vocal muscle par excellence, to whose contractions are mainly due the various changes of forms produced in the glottis during vocalization, cantation, etc. It has been very thoroughly described by Bataille, who has dissected it minutely, as consisting of three distinct portions; for which reason he has proposed for it the name *triceps-laryngea.*

These three portions are called by Bataille, 1, *faisceau plan;* 2, *faisceau médian ou arciform;* and 3, *faisceau paraboloid.*

The three heads arise in close propinquity from the rentrant angle of the thyroid. *The first* or *plain bundle* runs back with long, flat, horizontal fibres, to be inserted into the inferior border of the arytenoid cartilage. *The second* or *middle portion* forms a triangular pyramid, separable into two flat triangles, the base being inserted into the concave face of the arytenoid cartilage, its internal surface being adherent nearly throughout to the first or flat bundle; and near its arytenoidal attachment it anastomoses again with this flat bundle by short pennate fibres. Its superior surface is concave, and forms the floor of the ventricle. *The third bundle* assumes the form of an irregular parabola, with fibres divisible into superior, middle, and inferior layers, and sends out fibres of attachment to the first and second bundles, and also to the internal wall of the ventricle. The upper edge of the first bundle is intimately incorporated into the tissue of the vocal cords by short pennated fibres, and forms a large portion of the constituent structure of the cord, especially of its inferior surface.

The above résumé is but an outline of the minute anatomy of this complex muscle, which makes still further attachments to the epiglottis and other adjacent parts; but it is sufficiently descriptive to show its intricate arrangement and intimate relations with the vocal cord, so that it does not seem irrational to infer that it has no slight participation in the function of producing the various changes of form and tension in the glottis, by means of which a narrow band of tissue, scarce eight lines in length, and barely more than a line in breadth, and with but a single margin free to vibrate, is rendered adequate in response to emotion, or mental conception, to execute the immense variety of sound and modulation of which the human voice is capable. There is but little doubt that the careful study of the mechanical construction of this muscle, coupled with a sufficient number of accurate laryngoscopic observations as to the changes of form in the glottis, and consonant action of other parts attendant upon the production of musical tones in the various registers, will in time disclose to physiology many of the secret mysteries of the most distinctive, seductive, and suggéstive characteristic of humanity,—the voice.

MUCOUS MEMBRANE, GLANDS, BLOOD-VESSELS, AND NERVES OF THE LARYNX.

The contour of the larynx, externally and internally, is covered by mucous membrane continuous with that of the mouth and pharynx. It differs in thickness and degree of adhesion to subjacent parts. It is exceedingly thin and closely adherent on the free borders of the true vocal cords; thin, but less adherent in the sac of Hilton; loosely adherent to the ventricular bands; thicker and closely adherent on the posterior face of the epiglottis, and on the inner faces of the vocal processes; less adherent to the anterior surface of the epiglottis; very loosely attached to the ary-epiglottic folds and to the arytenoidal walls, which parts are thus extremely liable to become infiltrated, so that the inner surfaces almost touch, producing œdema of the larynx, or, as it is improperly termed, œdema of the glottis.

The epithelium is the ciliated variety found covering the whole mucous respiratory tract, with the exception of a narrow stripe of the squamous epithelium of the œsophagus, which mounts the larynx posteriorly, continues down the internal face of its posterior wall, and covers the free portion of the true vocal cords from one end to the other. On the inferior face of the cords the ciliated epithelium is again encountered.

The larynx is abundantly supplied with glands. They are found in the laryngeal pouches, in the pyramidal sinuses, in the posterior wall, in the ary-epiglottic folds where near their arytenoidal attachments they are accumulated in the form of an L, and are called collectively the arytenoid glands; in the pad of the epiglottis, and, isolated, elsewhere; but there are none upon the true vocal cords. They are sometimes solitary, sometimes in clusters, and vary from the size of a poppy-seed to that of a lentil.

The larynx is supplied with blood by branches from the superior and inferior laryngeal, and the crico-thyroid arteries.

The veins empty into the superior, middle, and inferior thyroid veins.

The nerves supplying the larynx are the superior, and inferior or recurrent laryngeal of the par vagum, with some filaments from the great sympathetic. The inferior laryngeal is the motor nerve, and supplies all the muscles except the crico-thyroid, which, with the mucous membrane, is supplied by the superior laryngeal, which also sends some fibres to the arytenoideus.

HISTOLOGY OF THE LARYNX.

According to the researches of Luschka, whose *Anatomie des Menschen* is the most elaborate and instructive on this subject which the writer has consulted, we learn that the cartilages of the larynx are composed of true cartilage structure—fibro-cartilage and reticular cartilage. The thyroid, cricoid, and the greater portion of the arytenoid cartilages are formed of ordinary cartilage, bluish-white in color. This form has considerable disposition during the course of time to undergo pathological degeneration. It undergoes earliest the fibrous degeneration, by which it becomes fragile, assumes a yellow color, or becomes spotted with yellow, and grates under the knife. In the so-called granular degeneration, it assumes a turbid color, sometimes yellowish, sometimes the color of asbestos. The intercellular substance is filled more or less with larger and smaller dark molecules, and contains isolated larger granular bodies distributed through it. Sometimes the degeneration is into porous osseous substance richly supplied with adipose matter, and this occurs so frequently in mature age that R. Columbus (*J. B. Morgagni, Adversaria Anat.* 1, 23) does not hesitate to enumerate the larynx with the osseous system. The ossification occurs most frequently in the cricoid and thyroid cartilages, sometimes occurring earlier in one, at other times in the other. Ségond says that the muscular process is always the starting-point of the ossification; and that next to the influence of age, the amount of exercise influences its degeneration. And he contends that this occurs earlier and in greater extent among professional vocalists than among individuals who do not make extraordinary use of their voices.

Less frequently than ossification, infiltration of carbonate of lime is met with, which is also said to occur in the capsules of the cartilage as well as its hyaline substance.

The epiglottis, the cartilages of Santorini, of Wrisberg, the sesamoid cartilages, the vocal processes and points of the arytenoids, the colliculus and vocal processes of the thyroid cartilage, are composed of yellow or reticular cartilage. These are liable to calcification rather than ossification.

The thyroid cartilage is ordinarily described as composed of two plates, alæ, or wings, which are joined at the centre. This is not sufficiently exact. It was first pointed out by Rambaud, and subsequently by J. A. Cavasse, Halberstma (Luschka), *et al.*, that there is an intermediate or central cartilage uniting the two wings—the lamina intermedia. This has much the form of an inverted wine-glass with flaring edges, or the large extremity of a trumpet; but occasionally it is rhomboidal in shape. It can be recognized in all ages and in both sexes, and can be readily separated in the unossified larynx after the perichondrium has been fully removed, which can be best done in those which have been immersed for some time in alcohol. A transverse or vertical section will show its existence, and it can be isolated by maceration in a dilute solution of potassa. It is composed of a hyaline cartilage structure, and by its more grayish color can be distinguished from the milky-white of the alæ proper. The cartilage of this intermediate portion of the thyroid on its inner surface receives the anterior vocal processes, to which the true vocal cords are attached. It has been shown by Gerhardt to be composed of reticular cartilage, but it de-parts from the usual construction of reticular cartilage, inasmuch as instead of the usual thickly-matted small, dark, short elastic fibre arrangement, here paler fibrils, sometimes plaited in bands, cross each other, sometimes horizontally, sometimes curvilinearly, forming interspaces in which large cartilage-cells are here and there distributed. This fibrous cartilaginous structure has been found unchanged by Luschka, even when the lamina intermedia had become completely ossified, which circumstance would seem to show that it may maintain some important physiological relation to the true vocal cords.

We have spoken of the yellow color of the vocal processes of the arytenoids. It is demonstrable by the microscope, as was first pointed out by Rheiner, that through the fibrous basement structure of their reticular cartilage, these processes are actually continuous with the fibro-elastic element of the true vocal cords.

The sesamoid cartilages first discovered by Luschka are only occasionally present. They have been observed in various degrees of development in both sexes, at all ages, and in both feebly and strongly built individuals.

The vocal cords are duplicatures of the elastic vocal membrane of the larynx; and their remarkable susceptibility of vibration is due to a peculiar fibrous band which forms their basement structure. The general mucous membrane projects beyond this band, enveloping it more or less loosely and permitting the separate action of the membrane as vibrating reeds in the formation of the falsetto tones. At their extremities the cords are reinforced with reticular cartilage, by which their susceptibility of vibration is secured, and their ossification prevented. Their anterior and posterior extremities are so thoroughly connected with the anterior and posterior vocal processes that their fibrous structure is inextricably blended into the felt-like elastic element of the vocal cords. In addition to this a large proportion of the fibres of the thyro-arytenoid muscle is so intimately bound up into this duplicature of elastic vocal membrane, and so incorporated into its structure, that it actually forms the largest moiety of the body of the cord.

There are found in the reticular cartilage of the epiglottis, irregular pits or notches containing follicular and racemose glands. This inlaying with glandular structure gives it a great disposition to ulceration, which, when it occurs, usually results in ulcers irregularly serrated in outline.

The bulging belly of the epiglottis is due in part to an increased thickness of cartilage, but in a greater measure to an accumulation of glandular and adipose tissue.

The perichondrium of the cartilages of the larynx is composed of thick areolar tissue, interspersed with a few irregular elastic fibres. It contains a tolerably rich network of blood-vessels. But few nerves can be traced in it, and, according to Luschka, only as primitive fibres. According to J. Engles, who has minutely investigated the structure of this perichondrium, that of the epiglottis is most richly supplied with nerves, and upon both its surfaces.

RHINOSCOPY.

Rhinoscopy is the term applied by Czermak in designation of his method of inspecting the posterior region of the nares by reflected light. It suggested itself at an early date to this observer as an outgrowth from laryngoscopy, and he first described [1] it soon after his name had become familiarly associated with the sister art. As inspection of the nostrils anteriorly is also rhinoscopy, it would be as well to call the other method posterior rhinoscopy.

Rhinoscopic examination of the naso-pharyngeal region.—The laryngoscopic apparatus suffices for rhinoscopic examination. The principles involved are precisely the same as in laryngoscopy; the only difference being in the position of the mouth mirror, which is to be placed beneath the soft palate and uvula, or behind them, with its reflecting surface looking upwards and forwards, so as to direct the light upon the posterior openings of the nasal passages and upon the parts in immediate proximity. The image of these parts is then seen in the mirror. The pharynx is to be most strongly illuminated at a point a little lower than that usually selected for laryngoscopic observation.

---

[1] Ueber die Inspektion des Cavum pharyngo-nasale und den Nasenhöhle vermittelst kleiner Spiegel. *Wien. Med. Woch.*, Aug. 6, 1859.

The primary requisite to a successful examination is the existence of sufficient space for the mirror between the velum and the posterior wall of the pharynx. When the hard palate extends unusually far back, it may be impossible to make an examination with the mirror, as happened in one case under the care of the author. Such cases, however, are altogether exceptional. As a rule, an examination may almost always be readily effected, though seldom with the facility that attends a laryngoscopic examination.

It is essential for the introduction of the mirror, that the soft palate should hang free from the posterior wall of the pharynx. When the mouth is opened for purposes of examination, there is usually an involuntary disposition to breathe through it. This causes the palate to apply itself against the posterior wall of the pharynx, and thus shut off all communication between the mouth and the nares. If breathing be performed through the nose, the palate drops, and the communication between nose and mouth is then free, as in ordinary respiration with the mouth closed. Hence we direct the patient to breathe through his nostrils while his mouth is open. This response of the palate to respiration through mouth or nose, and its play backwards and forwards, can be readily observed in a looking-glass. If the patient cannot succeed in maintaining respiration through the nose, we may force his palate to fall forwards by causing him to emit nasal sounds, such as the French *en;* and, as the respiratory current passes by the nostrils, the palate falls. This plan was suggested by Czermak. Should this device fail, we resort to forcible separation of the palate from the pharyngeal wall by means of a broad and flat hook passed under and behind the velum, and then drawn forwards and upwards by the observer. This plan is often but partially successful, inasmuch as it usually induces spasmodic action of the muscles of the palate, the disposition to which spasm is to be overcome only by repeated contact of the instrument until its presence and pressure is tolerated, or until the irritability of the muscles is exhausted. The same amount of time and patience devoted to the proper regulation of the respiration will insure the success of the latter and more desirable expedient.

The difficulties to be overcome in rhinoscopic examination are, with the exception of the respiration just treated of, the same as those described under the head of laryngoscopy.

The same mouth mirror may be used for rhinoscopic as for laryngoscopic examinations, only there is more frequent occasion for the employment of a mirror of smaller diameter. There is no necessity for attaching the mirror to the stem at a right angle, as recommended by some authors, nor is such a mirror as conveniently manipulated as the laryngoscopic mirror.

If a vertical position of the reflecting surface is desired, it may be obtained very readily by depressing the handle of the mirror. If, on the other hand, it be desired to gain a view of the roof of the nares, or of the vault of the pharynx, the handle can be raised so as to give the mirror a more oblique position. A reflection of the parts, exact as to size and form, such as we obtain of our faces in a toilet mirror, could be obtained only in the absence of necessary structures which prevent our seeing the reflection when the mirror is exactly behind the nares in a vertical plane. It is only an image in perspective of the parts in front of the mirror and above it that can be seen at best, and this we secure with the laryngoscopic mirror in rhinoscopic position much more readily than with the so-called rhinoscopic mirror.

In the earlier days of rhinoscopy, it was thought essential to employ some means of drawing the palate upwards and forwards; and various palate-hooks and elevators have been devised for the purpose. This want was probably occasioned by the use of the mirror at right angles to its shank. When such a contrivance is requisite, which occurs only occasionally, a flat plate of metal or hard rubber, three or four lines in breadth, terminating in an edge turned up for about one or two lines, and fenestrated or not, according to fancy, will be found serviceable. When the space between velum and pharynx is small, it may sometimes be enlarged by repeatedly drawing the velum forwards by means of a blunt hook, these manipulations being repeated at intervals for several days. The space may also be increased by confining the palate in two tapes passed through the nostrils, out of the mouth, and tied over the upper lip in front.

A sort of double T bandage with four tails answers this purpose, and may sometimes be employed in this way for purposes of more thorough examination, or for facilitating operative procedures. These contrivances are not well borne.

The use of a tongue-depressor is almost always necessary in a rhinoscopic examination. It increases the space between the tongue and the palate, and gives more room for the passage of the mirror.

When a large mirror cannot be used—and cases are not infrequently met with that permit the use of a mirror an inch and a quarter in diameter—small mirrors are passed first upon one side and then upon the other, so as to examine the structures of each side successively.

Instruments combining tongue-depressor and mirror have been invented by several observers, but they are altogether superfluous, inasmuch as the management of the tongue can be entrusted to the patient, thus affording the operator a chance to employ with his disengaged hand whatever other instrument may be necessary for treatment.

The Structures Subjected to Rhinoscopic Inspection are:—

The posterior surface of the soft palate and the uvula;

The posterior and part of the lateral portions of the septum of the nose, the turbinated bones, and the nasal meatuses;

The pharyngeal walls of the Eustachian tube and its orifice;

The vault or roof of the pharynx;

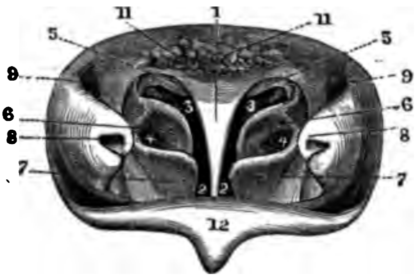
The lateral walls of the pharynx; and

The upper portion of the posterior wall of the pharynx.

These structures cannot all be examined in one and the same image; but by gently turning the reflecting surface of the mirror towards the different regions we are able gradually to complete a satisfactory survey of the whole in detail. In some cases we can see both choanæ, both Eustachian tubes, and most of the vault of the pharynx, in one and the same image. An image of this kind is represented in Fig. 21; and in some instances we can see much more of the surfaces of the turbinated bones, that is, much more deeply into the meatuses, than is here represented.

It is very essential to become familiarized with the appearances represented in the rhinoscopic mirror in order to be able to recognize the individual structures; not only because these parts are rarely submitted to dissection, but also because the idea of the relation of parts, as seen in the skull deprived of soft tissue, is not realized in the examination under consideration.

Fig. 21.



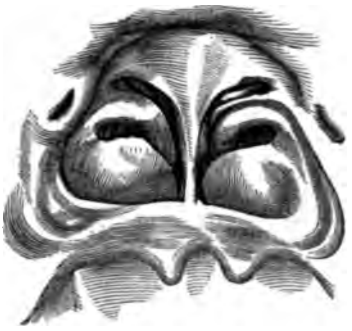
RHINOSCOPIC IMAGE.

1. Vomer or nasal septum. 2. Free space of nasal passages. 3. Superior meatus. 4. Middle meatus. 5. Superior turbinated bone. 6. Middle turbinated bone. 7. Inferior turbinated bone. 8. Pharyngeal orifice of Eustachian tube. 9. Upper portion of fossa of Rosenmüller. 11. Glandular tissue at the anterior portion of the vault of the pharynx. 12. Posterior surface of the velum.

If we examine the image represented in Fig. 21, we shall find the most prominent object to be a bright columnar ridge in the centre, gradually expanding above. This is the nasal septum. It is, in health, of a pale yellow, or yellowish pink color at its narrow portion, but as it expands its color gradually merges into the red of the pharyngeal mucous membrane above it. Following the outline of the expanding portion of the septum, we define upon each side the posterior border of each corresponding nasal opening, the lowermost portion of which is cut off from view by a horizontally curved projecting ridge of a red color, which, with as much of it as is reflected below, is the posterior surface of the velum. Following the inner curve of this velum round on either side, we observe it rising over the outer portion of each nasal opening, and forming a projecting ridge which is formed by the fibres of the levator palati muscle forming the anterior wall of the pharyngeal extremity of the Eustachian tube; and we find it continuous on the outside with another projection above, which is the cartilaginous extremity of the Eustachian tube; and between these two projections we observe a considerable depression, of triangular outline, which is the pharyngeal orifice of the Eustachian tube. Following the protuberance caused by the Eustachian tube backwards, we observe it defining a canal, the terminal fossa of which, as it runs upwards and outwards, is the fossa of Rosenmüller, lying between this lateral projection and the posterior wall of the pharynx. This is the point in which the Eustachian catheter is so often engaged by mistake during the use of that instrument.

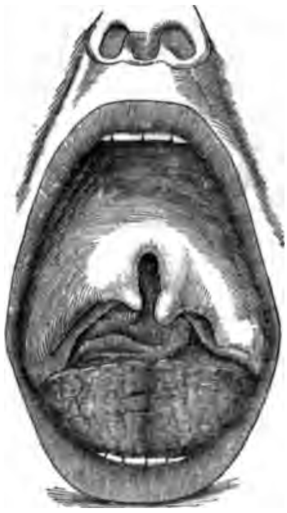
Returning to the central portion of the image, the parts in shadow on each side of the septum represent the free cavity of the nose on each side respectively. Following this shadow from below upwards on either side, we see it terminate in a large shadow, which represents the upper meatus; the light portion above this, still within the choanum, is the upper turbinated bone, of the lower portion of which a small portion is still further seen projecting into the shadow; the outer portion of the upper turbinated bone turns down and seems to be lost in a central bulbous portion which is the middle turbinated bone; this is partly covered by another prominent object which is the inferior turbinated bone; and above this and to the outside is a

Fig. 22.



Rhinoscopic image in a case of cleft palate.

Fig. 23.



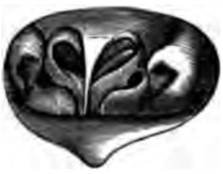
Case of cleft palate from which rhinoscopic image (Fig. 22) was obtained.

shadow representing what is seen of the middle meatus. Occasionally, but not in the image figured, we can discern the position of the inferior meatus just beneath the lower turbinated bone, only a portion of which is seen in the drawing.

A better view of the lower turbinated bones is obtained in a view represented in Fig. 22, and drawn by Dr. Packard from one of the author's cases of cleft palate, shown in Fig. 23 before closure of the fissure. As complete a view of these structures is occasionally encountered without the pre-existence of any defect in the palate.

In the instance referred, to the fissure enabled the mirror to be placed higher up than can ordinarily be done, and thus secured a better view of the middle and lower turbinated bones.

Fig. 24.



View of left Eustachian orifice.

Fig. 24 represents a rhinoscopic image from one of the author's cases, in which an unusually good view of the pharyngeal orifice of the left Eustachian tube is obtained by slightly rotating the face of the mirror to that side.

The color of the healthy mucous membrane of the nasal and naso-pharyngeal structures, as seen in the rhinoscopic image, varies from a pale grayish-red or yellow, with a mere tinge of pink, to a drab or the more decided red of the pharyngeal mucous membrane. The narrow column of the septum, and the inner or lower walls of the Eustachian orifice, are of a pale pink-yellow, sometimes decidedly yellow; the projections of the Eustachian tube are red; the superior turbinated bone is a light pink; but any of its lower or lateral surface that may be seen is dark-gray; the middle turbinated bone looks gray and is very distinct; the lower turbinated bone is still darker and less distinct; the sides of the septum, when not diseased, are drab or ashy-red; the other structures are red, the reflection of the velum at the Eustachian tube being of a lighter red below than above. The precise tint of each structure varies with the character of the light, its position influencing the shadows; and also with the position of the patient. The description attempted above corresponds as near as may be to the tints given by artificial light.

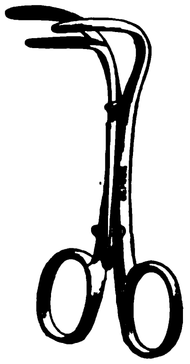
In gaining a view of the posterior nares, the first reflection seen in the mirror as it is passed under the velum is the image of the posterior aspect of the uvula, velum, and palatine arches; presenting together, especially when the parts are tense, much the general appearance of the outline of the image of the septum and nasal openings, especially should one of the molar teeth be reflected just to the side of the uvula. When this image of the velum and arches is seen, the handle of the mirror should be gradually depressed, or the reflecting surface be slipped up further behind the velum, when we will see the velum gradually extending itself as it were, and then turning on itself backwards at a right angle, looking not unlike a shelf of flesh, on top of which, and somewhat in its rear, we begin to recognize the true image of the septum and nares making its appearance in the mirror.

Examination of the nasal passages anteriorly.—This might be termed anterior rhinoscopy. A thorough examination of the anterior portion of the nasal passages should not be neglected in cases implicating the nostrils. Very often it will suffice for this purpose to throw the head of the patient back, and turn the point of the nose up so as to get the parts as much as possible in a horizontal plane, and with a good light upon them. Reflected daylight, or artificial light, is often much better than direct sunlight, as we can direct the illumination along the passages by moving a reflector, much more readily than we can by moving the patient's head.

The nostrils may be dilated by means of a pocket probe or some small instrument pressed against the outer portion of the nostril. A small aural speculum sometimes answers the purpose; and it is pushed back as far as the position of the nasal bones, so as to dilate the cartilaginous portion of the passage. A bivalve aural speculum has been modified by Mr. Hilton, by making the blades longer, broader, and slightly curved. Elsberg's three-leaved steel dilating speculum (Fig. 25), modelled after the tracheal dilator of Trousseau, answers admirably for this purpose.

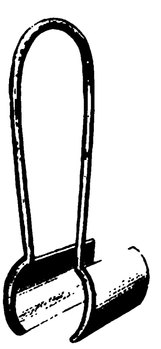
An excellent nasal dilator devised by Thudichum (Fig. 26) stretches the nostrils very satisfactorily. It is introduced closed, and then, as it expands, holds its position when once adjusted. If well borne it exposes the parts very effectually; but the pressure is usually so painful that a small amount of compression must be used to weaken the spring. It is especially well adapted for operating upon the deeper structures. Several sizes are requisite in order to suit the nostrils of the patients.

Fig. 25.



Elsberg's nostril dilator and speculum.

Fig. 26.



Thudicum's dilating speculum for the nostrils.

Dr. Metz uses a dilator made in two portions, each attached to a separate handle; these portions may be used singly or together.

Complete satisfactory examination is only occasionally possible, the deeper portions of the structures being entirely out of direct or reflected vision.

In exploring the nasal passages we can sometimes find good service in the use of the little finger, previously oiled and then employed as a probe. In this way we may sometimes be enabled to determine the position of ulcers, tumors, foreign bodies, calcareous concretions, etc., which we may not be able to discover either on anterior inspection with the speculum, or by posterior inspection with the rhinoscope.

In cases of doubt as to the occlusion of the nasal passages, Wintrich has suggested an indirect method of physical diagnosis which is noticed on account of its curiosity, without any comment on its value. The tympanitic sound yielded on percussion of the larynx, lowers in pitch when one nostril is closed, and becomes still deeper and weaker in tone when both nostrils are closed. If, now, it is found that no change is effected on the percussion pitch of the larynx by closing one or the other, or both nostrils, it is to be inferred, says Wintrich, that their permeability is occluded by the presence of secretion, tumor, or foreign body in one or the other nostril, or both, as the case may be.

CHAPTER III.

SORE THROAT.

SORE THROAT may be exceedingly mild in character, and may vary from mere annoyance to a condition of intense suffering as exhibited in the higher grades of inflammation. All the anatomical regions of the throat may be affected together, or the disease may be confined to one or more of them; and various names have been given to designate the special locality of the affection. Inasmuch, however, as the essential disease is the same in nature, produced by the same causes, and amenable to the same plan of treatment, it will be convenient to consider the varieties of sore throat together.

The name *cynanche* (from the Greek), and *angina* (from the Latin), has been applied to designate inflammations of the throat, especially when accompanied by disturbances in the functions of deglutition and respiration. Thus we have *cynanche parotidæa*, mumps, or parotitis; *cynanche tonsillaris*, tonsillitis, amygdalitis, quinsy; *cynanche pharyngea*, pharyngitis; *cynanche laryngea*, acute laryngitis; *cynanche trachealis*, croup; and we have *cynanche trachealis spasmodica*; *cynanche maligna*; *cynanche gangrœnosa, seu epidemica, seu purpuro-parotidea*; and several other cynanches, which it is needless to enumerate. If we prefer to call a sore throat *angina*, then we have *angina apthosa*, *angina œdematosa*, *angina sicca*, *angina pellicularis*, *angina nasalis*, in illustration of some varieties of sore throat not already indicated, besides other anginas, which represent the entire list of cynanches.

In view, therefore, of the great similarity of these affections in many respects, it will not be illogical to take a comprehensive view of sore throat in general; selecting for observation in detail such manifestations only as are often very prominent, or which, from their locality or their rapid progress toward a fatal issue, demand special attention.

COMMON SORE THROAT—ERYTHEMATOUS SORE THROAT.

Sore throat may be acute or chronic, superficial or deep-seated, idiopathic or symptomatic.

The most frequent variety of acute sore throat, though the symptoms are sometimes exceedingly moderate, is that of a simple erythematous inflammation. The mucous membrane of the pharynx, palate, and tonsils is found to be congested, or of a more or less deep red color, often swollen, often with its submucous connective tissue greatly relaxed, so that it lies upon the sub-surface in thick folds or rugæ. Sometimes, though more or less of the entire throat participates in the state of inflammation, the swelling is confined to the tonsils, one or both of them; their vessels being gorged with blood, and producing by pressure a state of hyperæsthesia of the gland, its entire surface is rendered exceedingly tender and painful to the touch. The uvula will be likely to be swollen, with its mucous membrane relaxed, so that it may lie upon the base of the tongue, and thus induce an irritative tickling cough. Sometimes it appears as though glued to one of the arches of the palate. There is usually more or less heat and dryness of the parts, with a moderate degree of difficulty in swallowing, principally on account of the pain excited by the movement; but sometimes, apparently, in part from a debility of the muscles. There is almost always some degree of fever, with more or less acceleration of the pulse. If the disease is any way active, the local and constitutional symptoms increase in severity, the heat of skin becoming very marked, and the pulse registering from 100 to 120 and even 140 beats in the minute. There will be pain in the back and limbs, sometimes of a very severe character, and increasing on motion, as though there were some rheumatic element in the complaint; and in fact Prof. Trousseau and others describe a form of rheumatic sore throat, not at all allied to that of ordinary inflammation. Sometimes the cervical glands become swollen and painful, though not often.

The treatment of this form of sore throat is very simple. It is well to confine the patient to bed in order to secure rest; and to have a light covering over him so as to equalize the heat of the surface as well as may be. If the patient have recently partaken of an ordinary meal, an emetic will often be of service, inasmuch as the digestion of the food would not be apt to be perfect. For this purpose, mustard in water is perhaps the best article, as there is nothing to be gained by the use of depressant emetics, such as ipecacuanha and antimony, while there is no necessity for resort to those of a more stimulant character, such as the sulphates of copper and zinc. A gentle but efficient laxative is indicated to assist the passage of the matters in the alimentary canal; and castor oil, or magnesia, or rhubarb may be employed to this end. If there is costiveness, a saline purge may be administered, such as the sulphate of magnesia, or the preparation of citrate of magnesia in general use. If the pain is very great, and the pulse frequent, a small amount of morphia and aconite may be judiciously added to the aperient. For the pain in the throat, the free use of demulcent drinks may be encouraged; and where there is intense heat of skin, the entire surface of the body may be sponged with slightly tepid water, or with water containing a small amount of vinegar or alcohol.

This, with restriction to a very light and easily digestible diet for a day or two, will usually be all the treatment required; the disease generally completing its course in from four or five to eight or ten days. If the pulse continues very high the other symptoms will not give much evidence of subsidence, and the tincture of aconite root, in doses of one or two drops, given at intervals of three or four hours, will almost always have a happy and satisfactory effect; but its administration should be discontinued, or at least be distributed between more lengthened intervals, as soon as it has produced any marked effect upon the pulse; for, the activity of the disease once abated, its own tendency is to prompt recovery. Care should be taken to guard against subsequent exposure to cold, and with this view flannel underclothing should be worn, if such be not already the patient's custom.

If one side only of the throat have been prominently affected, as is often the case, there will be a great likelihood that the other side will become affected in turn after a day or two of apparent convalescence; and if the patient has not been careful as to exposure, this second attack may be more severe than the first one.

The local affection does not often need topical treatment. Should this seem necessary, the use of pieces of ice, or of slightly astringent lozenges may be employed; but if the membrane be very much relaxed, the use of a weak solution of alum, preferably in the form of spray, or of a weak solution of carbolic acid, will constringe the parts, and frequently relieve their uneasiness in a few hours. Tannin, chlorate of potassa, sulphate of copper, etc., have been recommended for this purpose, and are often beneficial.

Occasionally the uvula is a source of a good deal of discomfort in this form of sore throat. It is quite apt to become œdematous from a submucous accumulation of serum, and may attain the size of the end of the thumb; and as the palate is somewhat impeded in its action, and apt to hang down in a relaxed condition, the uvula, already elongated by the deposit, lies upon the base of the tongue or immediately behind it, and gives rise to a constant feeling of irritation, with a desire to swallow, or a desire to expectorate; with which effects, or without them, there will be an irresistible disposition to relieve the tickling sensation by cough. Sometimes the uvula interferes considerably with deglutition, and in some instances seems to become entangled in the alimentary bolus, and half swallowed with it. This swollen condition sometimes comes on very rapidly, the uvula becoming distended and prolonged to twice or thrice its normal size in a few hours. It appears as an œdematous swelling, and is easily recognized as the source of considerable trouble. A puncture or two will usually suffice to give vent to the effused fluids, after which the swelling will diminish considerably; or the mucous membrane may be truncated at its tip. It is never necessary in these cases to excise the organ, as in cases of chronic elongation. Sometimes the entire uvula is enlarged on account of a sort of hemorrhagic stasis, and occasionally a drop or more of blood may exude to the surface. Under these circumstances the condition is readily relieved by scarification of the mucous membrane, a little operation which can be easily and rapidly performed.

The tonsils rarely give any trouble in this variety of sore throat, but if they do, the treatment to be pursued in the variety about to be described may be appropriately instituted.

PHLEGMONOUS SORE THROAT—TONSILLITIS—QUINSY.

Another variety of sore throat, evincing a higher grade of inflammatory action than that just described, is the phlegmonous sore throat, in which the action is not confined to the mucous membrane, but seems to affect chiefly the submucous connective tissue, which is apt to become destroyed in the process, leading to the formation of abscess, sometimes diffuse, oftener circumscribed; the diffuse abscess appearing mostly in broken down, depressed, or feeble constitutions.

In this form of sore throat the tonsils are usually affected in a greater degree than the surrounding structures, sometimes so to a marked extent, and the disease is designated as *tonsillitis*, *amygdalitis*, or *quinsy*. The tendency of this form of the disease is to terminate in suppuration, yet it sometimes terminates spontaneously by resolution, and can often be made to do so by appropriate treatment. Another variety of the disease seems to spend its force principally upon the submucous connective tissue of the pharynx. This is much less likely to terminate in resolution, and it may lead to very serious consequences, as it sometimes travels down the œsophagus, where the abscess is discharged, and occasions a permanent stricture from the effects of the cicatrization which follows; a stricture likely to lead, in many instances, to the death of the patient. In other instances, the infiltration into the cellular tissue of the pharynx becomes purulent with great rapidity, this action being attended with acute phenomena of fever. The pus may travel down the entire œsophagus, producing difficulty of swallowing, which is soon followed by difficulty of breathing, from the pressure exercised upon the larynx or trachea, or from blocking up of the laryngeal entrance by the swelling of the pharynx; and death results in spite of treatment, taking place in from three to four days, and sometimes suddenly. The operation of laryngotomy or tracheotomy, in these cases, affords but a temporary relief. They seem fatal from the very onset of the affection.

The phlegmonous variety of sore throat is often ushered in by a distinct chill, which is usually followed by fever within twenty-four hours. Besides the general discomfort attendant upon the febrile movement, there is very early a sense of pain and constriction in the throat, which gradually becomes more and more severe, interfering with deglutition. The entire structures of the throat usually present more or less evidence of inflammation on inspection, but the tonsils in particular bear the brunt of the disease; sometimes both of them in equal degree, sometimes one much more than the other, but usually one gland only being affected. The inflamed tonsil will appear swollen, irregular in outline, and covered with a thin layer of non-adherent whitish or creamy-yellowish tissue, different entirely from the patches observed in diphtheria. The swelling involves the arches of the palate as well as the sides of the palate itself, which is pushed forward into the mouth in the form of a tumid, angry-looking tumor. Occasionally the tonsil enlarges upward to such an extent as to press on the orifice of the Eustachian tube, and cause deafness. Sometimes there is considerable œdema of the palate and uvula, and occasionally, also, œdema of the larynx, to a greater or less degree, likewise. The pain and distress become intense as the disease progresses; deglutition becomes impossible in some instances, and in others it is so painful that the patient will not make the attempt to swallow. The patient is unable to close his mouth, or to open it widely, and he leans forward or to one side to allow the saliva to dribble away, being unable to swallow it, or afraid to do so, from pain, or dread of suffocation. The pain extends to the jaws, which are swollen so that the patient can with difficulty, or perhaps not at all, open his mouth to permit inspection of the parts. The tongue is swollen and covered with a dingy secretion. The breath is offensive. There is more or less difficulty of breathing. The voice is thick, or muffled, and there is great difficulty in articulation. As the disease progresses, sleep becomes difficult or impossible, sometimes on account of the mechanical impediment to free respiration, and sometimes on account of the disturbance of the nervous system.

This form of inflammatory sore throat sometimes subsides by resolution. More frequently, however, it proceeds to suppuration An abscess forms, which opens spontaneously if left to itself. Its progress can often be watched by inspection of the parts, and the spot at which it is pointing be detected by the eye or by the finger. The abscess frequently bursts at night, and sometimes unconsciously to the patient, who swallows the discharge. At other times he is awakened by the pus in the mouth. Sometimes the abscess is burst in an effort at vomiting. Whenever or however it opens, the relief is immediate, and the inflammation subsides quite promptly. Cases of death from accumulation of the contents of the abscess in the larynx are said to have taken place when the abscess has discharged at night; but they must be rare and very exceptional.

The attack, if it runs through all its stages, usually continues about ten days.

The treatment of this disease must be managed upon antiphlogistic principles; but it is not advisable to have recourse to general bleeding, or to leeches, on account of the difficulty of administering food to sustain the system and repair the loss of blood. Early in the attack, especially if the stomach be loaded with undigested food, an emetic will render good service, not only to the system at large, but also to the local affection. Perhaps some benefit results from the act of vomiting itself, due to the pressure of the muscles of the velum, arches, and pharynx upon the tonsil, driving onward some of the blood with which it is engorged. A non-depressing emetic, such as mustard, is the most applicable. We can administer advantageously a saline laxative mixture, containing a drop of tincture of aconite in each dose, with the addition of a little solution of morphia, if the pain is very great. The inhalation of steam from water alone, or from water impregnated with such substances as hops or chamomile flowers, or with the watery extract of opium or the camphorated tincture, will afford a great deal of relief to the throat; or the object may be attained by frequent injections of the spray of warm water upon the parts, or of warm water impregnated with cologne, or toilet-vinegar, applications which are very grateful to the patient, and which can be repeated *ad libitum.*

Warm moist applications, externally, give great relief, especially if the cervical glands are swollen. For this purpose a mass of cotton wool, wrung out of hot water, may be placed about the throat, and covered with oiled silk to restrain evaporation; or the spongio-piline may be employed for the purpose. These applications are much more cleanly than poultices of flaxseed, slippery elm, etc., and do not incommode by their weight. If employed, they should not be removed until their successors are ready to replace them, and they should be renewed frequently, so as to maintain equable warmth and moisture. Gargles, so often administered in this complaint, are of very little practical value, on account of the pain entailed by their use, which impairs their efficiency very much, and renders it difficult to secure proper contact with the affected parts. The use of medicated sprays, however, propelled upon the parts by means of appropriate apparatus, affords a most admirable means for employing local medication. A very efficient remedy, employed in this way, is sulphate of copper, in a solution varying from twenty grains to a drachm in the ounce of water, and employed freely, for several minutes at a time, every two, three, or four hours. Alum, tannin, the preparations of zinc, and nitrate of silver, are also recommended for this purpose. Appropriate substances, such as alum, tannin, etc., in the form of powder, may be blown upon the parts. The local application of the lunar caustic is recommended by some practitioners, but its efficient application must be often difficult, and very troublesome in its effects. Everything that induces hawking and spitting should be avoided as much as possible.

Where the tonsils are very much enlarged and the suffering severe, great relief to the tension, pain, and distress will follow scarification or puncture of the inflamed gland. A good method is to pierce the tonsil in its central portion with a long, narrow, sharp-pointed bistoury, and to cut the instrument out, horizontally, by an incision through the gland into the mouth.

This may be done in two or three places in rapid succession, and is easily accomplished by a steady hand. The bleeding should be encouraged by warm water taken into the mouth and allowed to run out again. The relief is often immediate, and as the engorged vessels are emptied of their contents they contract, and the circulation passes in its accustomed manner, producing a tendency to resolution. Many an inflamed gland has been prevented in this way from undergoing the suppurative process. But even when this cannot be accomplished, the alleviation of all the more severe local symptoms justifies the measure. It is true that these incisions are not universally recommended, but it is equally true that they are very beneficial; and they are not at all painful to the patient, especially in comparison to the suffering that he is already enduring.

Should suppuration have commenced already, there can hardly be any doubt as to the propriety of using the knife, and it should be entered at the spot where the abscess is most likely, from appearances, to break. Care must be taken to keep the edge of the knife turned towards the interior of the mouth, so as to prevent injury from the untoward movements of the patient, whose head it may be desirable, under certain circumstances, to have held by an assistant. If the operator is not perfectly sure of his hand and of his patient, it will be at least prudent to protect the blade of his knife by covering it with paper, linen, or plaster to within half an inch or so of the point, or such distance as he may deem desirable for penetration.

As soon as the pus has been evacuated, the patient usually expresses, in grateful language, his sense of the relief which has been given him.

Two or three days' intense suffering may be saved by an early puncture of the abscess. This once discharged, recovery is prompt. The general treatment is that already recommended in erythematous sore throat.

During the course of the affection care must be taken to sustain the patient's strength, which suffers severely from the violence of the attack, the nervous complications, and the difficulty, and often the impossibility, of taking nourishment. Liquid food can almost always be taken, and should be of the most nutritious character. If it cannot be swallowed in sufficient quantity, we can resort to nutritive enemas. The parts should be spared the effort of swallowing as much as possible, and medicines that can be given by the rectum or by the skin should not be unnecessarily administered by the mouth. An opium suppository to induce sleep is often preferable to a dose of morphia by the stomach.

Although the affection is usually limited to one side, the other side not infrequently becomes affected after the discharge of the first abscess, exhibiting in this particular some similarity to the action of mumps. If this is about to happen, the administration of bark, iron, and even of stimulants becomes necessary in order to sustain the strength of the patient, and enable him the better to endure the second attack.

Some persons are peculiarly liable to repeated attacks of quinsy, recurring every year or two, or even oftener. Such patients should be very cautious about exposure, and be taught to apply for medical aid at the very first symptom of the malady.

Frequent attacks of this kind result in a permanent enlargement of the tonsils, which become indurated and often attain a great size.

A very desirable plan of securing additional protection from attacks of sore throat of every kind, in those particularly susceptible to them, is to bathe the head, neck, shoulders, and chest every morning, or every night and morning, with cold water.

The cold sponge-bath, where it can be tolerated, is an admirable tonic to the skin, and, by promoting the capillary circulation, through it to the system at large. Its effects may be heightened, where desirable, by friction with a towel after the bath, and sometimes by friction before the bath also. It is rarely necessary to use a rough towel or a flesh-brush for this purpose, unless there is great difficulty in "bringing the blood to the surface," and the attainment of this object is considered sufficiently important to justify the harshness. Where the cold bath chills the surface, or does not induce the usual glow after it, the specific gravity of the water should be increased by the addition of a due amount of salt. In cases where this cannot be borne, local baths of warm water, or warm salt and water, to small portions of the surface at a time, may be substituted, and the system be gradually educated to endure the cold water as improvement progresses.

The following notes of a few cases from the author's case-books will illustrate the method of treatment.

Tonsillitis.—R. D., laborer, æt. 30. Acute tonsillitis, several days' duration. A solution of sulphate of copper was applied locally twice a day for four days, and on the fifth he was well.

Ulcerative Tonsillitis.—Neil F., æt. 23, applied April 24, 1867, after two days' intense suffering with sore throat, dysphagia, and dyspnœa, the severity of which were still increasing. The tonsils were swollen and ulcerated, and occluded the isthmus between mouth and pharynx. A nebulized solution of sulphate of copper, 40 grs. to the oz., was applied locally; a prescription written for 10 grs. each of calomel and jalap, to be taken at night, with directions to take a dose of Epsom salts in the morning. The local applications were repeated twice a day for two days, then daily for two days, which completed the necessary attendance.

About the same time, Catherine K——, æt. 35, unmarried, applied with an ulcerative tonsillitis, affecting the right side especially. A pill of Croton oil and calomel was ordered to overcome a constipation of ten days' duration, which operated twice the next day with a satisfactory effect. Nitrate of silver was applied locally to the parts, but did not appear to be as beneficial as the sulphate of copper, which was substituted for it on the third day, with better effect.

John B—— had had sore throat for several days (April 3, 1867). When sent to me the tonsils were seen to be very much enlarged and pressing against each other, so that the uvula lay over them as upon a shelf. The tonsils were ulcerated, and there was a purulent discharge. There was very great dysphagia, and considerable difficulty in breathing.

The tonsils were scarified, and a solution of sulphate of copper, 30 grs. to the oz., freely applied by means of the spray-producer. Respiration and deglutition were at once improved.

The local applications were kept up twice a day for four days, by which time all signs of active disease had abated. One week after this the right tonsil was in part excised, on account of a permanent hypertrophy.

ULCERATED SORE THROAT.

The peculiar characteristic of this form of sore throat is indicated by its name. Though but moderately severe in some instances, in others it exhibits from its very commencement a tendency to phagedenic ulceration of a malignant character; producing gangrenous sloughs, which destroy large portions of tissue and extend into the vessels, giving rise to hemorrhage which is sometimes fatal. It is that form of sore throat often described under the name of *angina maligna* or *tonsillitis maligna*, indicating the serious nature of the malady. It is not a frequent affection, and is usually attended with that general condition of system denominated typhoid. It sometimes follows scarlatina, and is occasionally attendant upon diphtheria. Sometimes it supervenes upon measles, small-pox, dysentery, and typhoid fever. It is also met with in syphilitic sore throat, and sometimes attends epithelial cancer of the throat; beginning usually in these instances in the palate, and extending to the pharynx and tonsils. It is rarely a sequel of inflammatory sore throat.

There is often, at the same time, an irregular eruption on the cutaneous surface, principally of an erythematous character. Fever is present, always of a low type, with a dark flush upon the face, a glassy look about the eyes, a haggard expression of countenance; and as the disease progresses, there is a fetid odor of the breath. The pain is not so severe as in the forms of sore throat already described, except, perhaps, in children, in whom it is difficult to estimate the exact amount of suffering. There is some dysphagia, but rarely actual difficulty of swallowing to any marked degree. On inspection of the parts, the tongue will be found coated with a dark creamy secretion; the tonsils will be swollen and of a deep-red color; and there will be swelling, if not œdema, of the palate and uvula. The pharynx, too, participates in the condition of the surrounding parts, and sometimes to a marked extent. Soon after the commencement of the affection, dark ash-colored ulcers will be seen occupying the surface of the tonsil and the surrounding structures. These will be excavated. The ulcers soon slough, and there oozes from them a fetid, ichorous, or sanious discharge. The cervical glands become swollen and painful. Although the voice becomes weak and muffled, there is rarely any active participation in the disease involving the larynx. Extension to the upper parts of the pharynx and to the nasal passages is quite frequent.

The ulceration extends rapidly and exhibits the phagedenic character, and when the sloughs separate from the tissues they expose deep ulcerations with excavated edges of a dark or yellowish appearance. This gangrenous condition may be confined to the tonsil, but more frequently extends to the adjacent parts, destroying in its progress the uvula, and often more or less of the soft palate. Sometimes it is impossible to arrest the progress of the gangrene, and it extends from the pharynx to the subjacent structures, penetrating the carotid artery and producing fatal hemorrhage. A recent instance of this nature occurring in a case of phthisis is recorded by Mr. Robert Grahame.[1] The phagedenic action commenced in the pharynx; and in spite of active treatment, invaded both tonsils, the uvula, the soft palate, and the lateral walls of the pharynx; producing hemorrhage which required ligation of the common carotid artery. The operation was successful in its result.

The matters discharged escape by the mouth and nose, and are extremely fetid in odor, so fetid that their effluvium has been sometimes compared to that from the fæces. Often diarrhœa sets in towards the last, soon followed by death.

The diagnosis of this disease presents no difficulty when the case has made any progress; and in the earlier stages it may be recognized by the depressed state of the general system, the absence of intense pain, and the dark unhealthy appearance of the affected parts.

---

[1] *London Lancet*, Aug. 27th, 1870, p. 290.

The prognosis is unfavorable, though cases often recover. Death may occur by syncope, coma, or from gradual exhaustion of the vital forces.

When cases of this kind recover, there often remains a horrible degree of deformity to mark the ravages of the disease. As cicatrization occurs, the position of the parts becomes very much changed. The palate adheres by its sides, and sometimes almost by its entire surface, to the wall of the pharynx, and in some instances there has been complete occlusion of the upper or nasal portion of the pharynx. The worst case seen by the writer was one in which the space between the adherent soft palate and the posterior wall of the pharynx was barely large enough to admit the end of the finger. There is more or less alteration of voice, some difficulty in articulation, and often serious impediment to comfortable deglutition, and to satisfactory use of the pocket-handkerchief.

Operations for the relief of this condition have been proposed, but there is considerable difficulty in the after-treatment, in consequence of the tendency of the parts to reunite. Cauterization of the cut edges, and the frequent interposition of bits of sponge or linen between the divided surfaces, would be required to prevent this re-adhesion. It may be that severing the parts with the galvano-cautery instead of the knife would promise a more speedy hope of success.

The treatment of this form of sore throat must be of the most active and supporting character; that, in a word, which would be adopted for the arrest of gangrene anywhere.

Food of the most nourishing quality, such as concentrated broths, milk, cream, and eggs, is to be administered as freely as the patient can be made to take it; and wine or brandy may be added to the food or given separately, and with no stingy hand. The forces of the system are to be kept up at all hazards. Medicinally, the sulphate of quinine in large doses, or the liberal use of the old decoction of cinchona, are indicated; to which may be added, if desired, the tincture of the chloride of iron. For my own part, I would rely chiefly on eggnog, homemade beef essence, and quinine. Fortunately, swallowing is not usually very difficult, and sufficient nourishment may be taken by the mouth. Should the dysphagia be very great, artificial measures must be resorted to for the introduction of nutriment. Enemas, containing a few ounces of beef essence, an ounce of port wine, and ten or fifteen grains of quinine can be administered three or four times a day.

The local treatment is also important. If the disease is superficial, the ulceration not having extended beneath the mucous membrane, the best applications will be those of hydrochloric acid, nitric acid, caustic potassa, bromine, etc.; substances that will destroy the diseased tissues promptly, so as to expose a healthy surface beneath them. If this cannot be done for fear that the process is involving the blood-vessels, or if it prove unsuccessful in restraining the further progress of the ulceration, we are compelled to depend on our constitutional measures, and to resort simply to palliative remedies locally, such as weak solutions of nitrate of silver, dilute hydrochloric acid, alum, etc., to which the extract of opium, or some other preparation of it, may be advantageously added. Washes or sprays of chlorate of potassa, bromide of potassium, and the various remedies employed for the relief of ordinary sore throat, are often very comforting, though without active influence on the disease. If the disease is progressing in the region of the great vessels, measures for compression should be at hand for the use of the attendant, and the surgeon should be prepared for the emergency of securing the carotid artery.

MEMBRANOUS SORE THROAT.

There is a variety of sore throat, almost always more or less met with at all seasons, characterized by the exudation of a fibrinous material which coagulates into a pellicle or false membrane. These cases are very often mistaken for diphtheria, and account for much of the success claimed for the various treatments of that disease. For, apart from the immediate danger sometimes attending the mechanical obstruction in cases implicating the larynx,—cases, however, which are very rare,—the tendency of this affection is to recovery; while a similar tendency in diphtheria is, as we shall see, doubtful. This form of sore throat is often met with during the prevalence of phtheria, and sometimes may be a starting-point of that sease. Discrimination is therefore of paramount importance.

The peculiar manifestation of the disease is preceded for o or three days by the symptoms of ordinary sore throat, pervening upon a chill with febrile reaction, and symptoms general derangement of the digestive, secretive, and nervous stem. The most frequent cause is exposure to cold when the dy is heated, or in a state of perspiration. The throat fection is usually confined to one side, and involves the rvical or submaxillary glands to a moderate degree only. here is pain and difficulty of deglutition, an uneasy or painful nse of heat and dryness in the throat, extending upwards wards the ear, sometimes into the nasal passages, and occaonally into the larynx.

On examining the throat there will be found tumefaction f the tonsils, which will be seen to be covered with a whitish r yellowish-white pultaceous exudation, but slightly adherent the mucous membrane.

It was remarked by Brettonneau, insisted on by Trousseau, nd demonstrated by Dr. Gubler, that this affection is essentially n herpetic eruption of the mucous membrane of the throat. rom their investigations it appears that within a few hours fter the commencement of the affection there may be observed n the tonsils, palate, or pharynx, a red eruption, more or less confluent, but sometimes discrete, which soon becomes ulcerated; the ulcerations becoming covered almost immediately with a plastic exudation of a grayish-white color.

The exudation, spreading beyond the limits of the ulceration, becomes coalesced with similar exudations covering neighboring ulcerations which have commenced in the same manner, forming, in this way, membranous patches of considerable extent. The initial point of local disturbance has been an herpetic vesicle, which, shortly after its production, has become ruptured, leading to the result just described. Prof. Trousseau did not consider the mere amount of eruption sufficient to account for the entire extent of membranous deposit. He believed that the local inflammation preceding the development of the herpetic vesicle, and accompanying and following it, extends to the adjacent parts, and there manifests itself by redness, swelling, and œdematous infiltration; and that this inflammation, although not ulcerative, favors an exudation of fibrinous material, the same as that which appears upon the ulcerated surfaces. That there is ulceration of the mucous membrane inflamed in this manner is perhaps likely, from the fact which Prof. Trousseau himself mentions in this very connection; and that is, that when this deposit is detached, as by a pledget of charpie, there is found below it an ulceration more or less extensive; although there may be but a small point of ulceration remaining, or even no trace of primitive lesion at all, from complete cicatrization of the mucous membrane.

In many of these cases an herpetic eruption exists at the same time at the angles of the mouth, on the internal surface of the lips and cheeks, or upon the tongue; and under such circumstances there can be no doubt about the diagnosis.

The prognosis is favorable in this disease, recovery being spontaneous in eight or ten days, in the majority of cases; still it has been known to prove fatal, especially in children, by extension into the larynx, and even further into the air-passages; death taking place by asphyxia.

Prof. Dickson mentions, in his lectures, a fatal case of this kind in a child, in whom, after death, he found the deposit lining the larger and smaller bronchi of the whole of the left lung. The deposit was in a tubular form, and so extensive that he dissected off portions of it as long as his finger. He considers it analogous to a form of tubular diarrhœa[1] described by Good, in which the pseudoplasm forms a tube in the intestines; and refers to a case mentioned by West, in which a membrane of this kind lined the whole œsophagus.

This membranous deposit is often found upon the ulcerated surfaces of mucous membrane, and also upon cutaneous ulcers, and the broken cuticle of blistered skin. It presents a similarity to the deposit found upon similar surfaces in diphtheria, but does not constitute diphtheria, there being an entire absence of the toxic symptoms of that disease.

---

[1] This form of disease has been recently described by Dr. Da Costa as membranous enteritis. *Am. Jour. Med. Sci.*, Oct., 1871, p. 321.

The treatment of the form of membranous sore throat under consideration is very simple. Laxatives, demulcents, and anodynes are called for, to moderate the general disturbance of system. The local affection does not demand active interference, and may be let alone if the suffering is not severe. Solutions of alum or borax may be projected upon the parts in the form of spray; or they may be applied by means of the camel-hair pencil. These topical methods are preferable to the use of gargles, just as in other affections of the throat, in virtue of the avoidance of muscular effort in the act of gargling.

Although this disease is usually of a transient character, lasting on the average from eight to ten days, cases now and then occur in which trains of the manifestations described succeed one after the other; the disease of the throat continuing for weeks and even months. Under these circumstances, applications of dilute muriatic acid are said to have a more positive and permanent effect upon the exudation than the milder ones of borax and alum, or even the application of nitrate of silver. Warm fomentations about the throat, the inhalation of the vapor of warm water, simple or medicated with opium, with rest in the recumbent position, the use of cinchona and iron as tonics, and the maintenance of a nutritious diet, would seem to form the most appropriate method of management for these cases.

This form of membranous sore throat sometimes becomes the starting-point of malignant or phagedenic sore throat. It has already been stated that when diphtheria is prevalent, common membranous sore throat may invite an attack of diphtheria; and that it is often met with during the prevalence of diphtheria. If, therefore, there be any doubt as to its nature—and doubt may readily arise under such circumstances—the safest plan for the practitioner would be to treat it as if it were diphtheria. There is nothing to be lost if the case should turn out to have been only common membranous sore throat; and everything will have been gained should it turn out to be diphtheria. Under the former circumstances, the practitioner must be on his guard against vaunting any new remedy as having cured a case of diphtheria. As already mentioned, a great deal of confusion has arisen regarding the therapeutics of diphtheria for want of due discrimination in this very respect.

The following case of membranous sore throat presented some unusual features which I have met with but once or twice:—

Patrick F. (Jan. 14, 1867) had had sore throat with inability to swallow for several days. The palate, arches, and pharynx were covered with a lead-colored fibrinous exudation. I applied locally a solution of acid nitrate of mercury, one part to ten of water, which excited profuse expectoration of large quantities of dark, ropy, fetid mucus, hanging in strings from his mouth to the floor, and continuing to be discharged for fully half an hour. A cathartic, containing ten grains of blue mass, five of jalap, and one of ipecacuanha, was given at bed-time, and a dose of Epsom salts in the morning; and after this, he was instructed to take a solution of muriate of ammonia in glycerine, ten grains to the ounce, *pro re nata*, as an expectorant. The next day there was no longer any difficulty in swallowing, and he was able to partake of a hearty meal of meat. He had no further trouble. This patient had been placed under my care as a case of diphtheria.

CHAPTER IV.

DIPHTHERIA.

DIPHTHERIA is an infectious disease of a low type, whose principal local manifestation is the formation of a pseudo-membranous deposit in the pharyngeal and naso-pharyngeal region. It seldom attacks persons in first-rate health, living under good hygienic influences, but rather those broken down by over-work, disease, abstinence, or indulgence; and especially patients subject to sore throat, acute or chronic, particularly when the mucous membrane of the throat is in part denuded of its epithelium. It attacks persons of all ages, but children and youthful adolescents most frequently.

Although sometimes appearing sporadically, diphtheria is essentially an endemic disease. It seems to be due, at least in part, to the presence of some cryptogamic vegetable poison in the atmosphere, which alights upon the pharynx during the act of inspiration. There the low organism continues to be propagated, and is absorbed into the blood, which it poisons. One of the effects of this poison is a low grade of inflammation, giving rise to the exudation of plastic material similar, as far as has been ascertained by chemical and microscopical examination, to the false membrane formed in croup; similar too, it is said, to the plastic exudation that follows the local application of cantharides, ammonia, hydrochloric acid, and other vesicants. Evidence of the cryptogamic vegetation is occasionally found in the microscopical examination of the diphtheritic deposit itself, and it is difficult to believe that it can be altogether due to developments which have taken place within the body. That the disease is infectious is sufficiently proven by the sad fact that some of the members of our own profession have paid the death penalty of contracting this disease, from direct contact of the material coughed into their faces while cauterizing the throats of their patients, or voluntarily drawn into their mouths while rescuing a tracheotomized patient from asphyxia, by sucking out through the wound the accumulations threatening the suffocation.

The fact that various experimenters have failed to infect themselves with diphtheria by placing the plastic material in contact with their own mucous membranes, or even beneath them by the aid of the lancet, only proves that it is not inoculable, not that it is not contagious.

Diphtheria usually begins with sore throat, with redness and tumefaction of the tonsils, palate, and pharynx, usually on one side or the other, sometimes upon both. If one side is unaffected at the commencement, it is apt to become involved during the course of the disease. The submaxillary and cervical glands of the side affected are also swollen and tender. These symptoms are not always of sufficient extent to excite alarm. Cases are not infrequent in which patients have continued about their usual employments while the disease was progressing, its nature having become discovered often too late to prevent a fatal termination. After a few hours, a day or two, or even longer, there will be noticed, somewhere upon the tonsils, soft palate, or pharynx, a whitish or grayish exudation, usually in patches. This may remain confined to a limited space, or it may extend over the entire pharynx, sometimes into the larynx and thence down the trachea, sometimes mounting the pharynx and entering the nares. Its appearance in this latter situation is denotive of the gravest danger, even though there should be but little evidence of the disease elsewhere, or little evidence of general disturbance. The extension of the disease to the nares may be dreaded when there are symptoms of coryza and epistaxis. The false membrane, at first thin, particularly at its edges, soon thickens, and often becomes darker in color, presenting the yellowish tinge and granular appearance of chamois leather. By imbibition of the coloring-matters of the blood it often becomes brownish, or even almost black. The constitutional symptoms are usually those of a typhoid character, there being, as a rule, comparatively little febrile excitement, but rather a degree of general languor and nervous debility.

Although the pharynx or its immediate neighborhood is the usual seat of the deposit, it is also liable to occur upon the other mucous outlets, and upon the denuded skin; the latter circumstance, perhaps, an additional argument in favor of the local nature of the affection at the initial period of disturbance.

In a case which progresses favorably without local treatment, the false membrane, after a few days, gradually disappears from circumference to centre. This exfoliation may be followed by a reappearance of the deposit a second, and even a third or a fourth time. Similar reproduction will follow its removal by artificial means. When thus removed, the parts beneath do not exhibit any evidence of ulceration, even though the deposit had resembled that covering a gangrenous ulcer. There is usually a slight excoriation noticed, due to the removal of the epithelium, the presence of which can be discovered upon the false membrane by means of the microscope.

Deglutition, as a rule, is not difficult, unless there be a great deal of swelling, but it is nevertheless often impeded on account of paralysis of the pharyngeal and palatine muscles, even when the swelling is but moderate. There will be no difficulty of respiration until the membrane has become formed within the larynx, an occurrence which does not take place until after it has made its appearance upon the pharynx. Its gradual extension can be watched in the laryngoscopic mirror, mounting the lingual face of the epiglottis, then covering its laryngeal face until it appears as if ensheathed within the finger of a leather glove, and then mounting the aryteno-epiglottic folds in its course over the interior of the larynx.

Diphtheria is pre-eminently a fatal disease, not alone from the presence of the membrane in the larynx, as in croup, but principally from the blood-poisoning which has taken place, altering the blood in character as well as color, and rendering it unfit for the purposes of nutrition.

There are evidences of this systemic poisoning other than those which mark the local manifestations of the disease. These are the asthenic or typhoid condition of system, the existence of albuminuria during the course of the disease, and a disposition to paralysis of the muscles concerned in deglutition; once in a while of the muscles of phonation, not infrequently of the muscles of visual accommodation, and sometimes of the muscles of the limbs and other portions of the body, occasionally amounting to general paralysis. This diphtheritic paralysis follows a state of convalescence from the immediate affection. This shows that the poison has affected the nervous system, and to an extent, perhaps, commensurate with the gravity of the previous symptoms.

Fortunately, the paralysis following diphtheria is not of a permanent character, and usually yields readily to treatment by local electrization.

Diphtheria must be discriminated from common membranous sore throat on the one hand, and from croup on the other. It is believed that the descriptions of these diseases given under their respective heads will be found to afford the points necessary for differentiation.

The treatment of diphtheria should be active and efficient. Under the view that it is of parasitic origin, and that it is essentially a poisoning of the blood, producing an impairment of the general system, the treatment would be directed towards destroying the cause as much as possible, and supporting the strength of the patient by means of food of the most nourishing character, aided by the administration of tonics and stimulants. Low forms of organism are destroyed by contact with sulphurous acid, and this explains much of the success of the sulphur treatment which has been so highly recommended from various reliable sources. This treatment may, in the first instance, be directed upon the local manifestations of the disease, and may also be directed towards introducing sulphur into the blood. Local treatment has been highly extolled in diphtheria; it has been unhesitatingly denounced; and both denunciation and praise have proceeded from good authority. Those who have but a superficial knowledge of diseases of the throat are apt to consider local treatment as signifying the use of the nitrate of silver. Now if we examine into the cases which have given rise to this difference of opinion, we shall find very often that the local treatment which has been effectual has consisted in the employment of materials containing sulphur or some other agent capable of destroying low organisms. Nitrate of silver, there is no doubt, has been productive of good results in some instances, but it is the very remedy which is denounced the most, and there is no doubt that it is sometimes actually injurious. But we find Trousseau and others, who recommend the use of nitrate of silver very highly, telling us that they have found results in many respects equal, and sometimes superior to those of nitrate of silver, in sulphate of copper and in alum. It may be stretching a point very wide to attribute the beneficial effects to the presence of sulphur in these salts; but when we reflect on the fact that the local application of the sulphur itself and of sulphurous acid is still more efficacious, we cannot help thinking that there may be some foundation for the notion. Carbolic acid applications have likewise been shown to be efficacious, and perhaps on the same principle, as being antagonistic to atmospheric germs.

To the efficacy of the sulphur treatment the author is able to bear witness from personal experience. Some two or three years ago he was called in consultation to a number of cases of diphtheria, sometimes to several in a single day. In all of them the use of the spray of diluted sulphurous acid water, as recommended by Dewar, applied frequently to the parts, did good service. In some of these cases, or in others which had occurred in the same families, pencillings with nitrate of silver, carbolic acid, muriatic acid, and other remedies had proved unavailing. In one family, in which three children had been lost in the space of a week before my co-operation had been invited, we had the pleasure of saving two others, one of whom was attacked while in attendance upon the fourth case, which was said to be in all respects as unfavorable, when I first saw it, as the fatal cases had been at the same period of the disease.

The treatment consisted, in the instances referred to, in placing the patient in bed in a room warmed by fire, with a vessel of water on the fire to keep up a gentle evolution of steam. The spray of sulphurous acid water was projected into the mouth and pharynx from a steam apparatus every two or three hours, for about ten minutes at a time. Eggnog and beef-tea were given freely as nourishment. Quinine and the tincture of the chloride of iron were administered four times a day in full doses; and lozenges of chlorate of potassa were allowed to dissolve in the mouth *ad libitum*, each lozenge containing one grain of the salt.

I found the use of the sulphurous acid spray to do more good than the vapors of lime, which I had already used in previous cases, and which had been resorted to unavailingly in several of the cases visited at that time.

As far, then, as my own limited observation goes, it is in favor of the use of sulphur.

By means of a hand-ball apparatus, with a long tube, the spray can be projected into the nostrils and up behind the palate. Where there is the slightest evidence of approaching implication of the nares, these cavities should be washed with the sulphurous spray, or with a solution of alum. It would not be bad practice to cleanse them out once or twice a day in every instance.

The curative powers of the hyposulphite of soda in diphtheria, first suggested by Dr. Tubbs, of Upwell,[1] employed both locally and internally, is doubtless due to the influence of the sulphurous acid; and this may be resorted to under circumstances where sulphurous acid cannot be readily obtained. The local treatment consists of two applications daily of three drachms of the salt in an ounce of a mixture composed of two parts of glycerine and six of water; in addition to which a gargle is used every hour, containing half a drachm of the hyposulphite to half a pint of water, with half an ounce of glycerine. It is better to wash the parts by means of a syringe. The hyposulphite is administered internally in doses of from one to three grains to children, and eight to ten grains to adults, and repeated every four hours.

When flowers of sulphur are used, they can be blown upon the parts, or placed upon them by means of a moistened mop; and this contact is renewed as soon as the previous application has disappeared from them. At the same time sulphur is administered internally in frequent doses, and also used in gum-arabic water as a wash or gargle.

---

[1] *Med. Times and Gaz.*, Dec. 30, 1865.

The blood-poisoning nature of diphtheria is evident from the serious effects which sometimes follow after the patient has recovered from the disease. There are, as already mentioned, certain disturbances of accommodation and other defects of vision; paralysis not only of the muscles of deglutition, but sometimes of other muscles, and occasionally general paralysis.

Nourishing food, fresh air, and general tonics usually effect the gradual subsidence of these symptoms; and when obstinate, the employment of electricity is an effective remedy for the local paralyses.

The question of the performance of tracheotomy will sometimes come up, in cases where the larynx is being invaded by the false membrane. The operation is less promising of success in diphtheria than in croup. Before any operation of this kind is instituted, it will be well, when at all practicable, to become assured, by laryngoscopic examination, that the symptoms of suffocation seeming to call for the operation are really due to mechanical obstruction. The tendency of the lips of the wound to become covered with the diphtheritic deposit should be combated by whatever means may have proved efficacious in affecting the deposit in the throat. Nourishment and stimulation are fully as necessary after the operation as before it, if not more so.

CHAPTER V.

THE SORE THROATS OF THE EXANTHEMATA.

The Sore Throat of Small-Pox.—The throat is liable to be affected in small-pox, an eruption forming upon the mucous membrane similar to that appearing on the skin. The involvement of the throat is usually indicated by excessive salivation; the secretion increases gradually in quantity, and becomes more and more viscid. If the larynx is involved, as happens not infrequently, there will be more or less hoarseness of voice and other concomitant symptoms of extension of the inflammation into the larynx. This inflammation may prove fatal by œdema, which may even occupy a position beneath the glottis, a specimen of which condition is preserved in St. Thomas's Museum.[1] The existence of pustules upon the inside of the cheeks, on the uvula, palate, and pharynx, is well known; they have often been seen occupying these situations.

Since the introduction of the laryngoscope into medical use, small-pox pustules have been frequently seen in the larynx during the progress of the disease. That the larynx was sometimes invaded was, however, well known before the days of laryngoscopy, for the evidences of the existence of variolous pustules in the larynx, below the glottis as well as above it, have been found in the post-mortem examinations of persons dead of the disease.

The appearance of variolous pustules, as seen in the larynx, has been depicted by Türck, who describes[2] a case of small-pox in the adult, in which hoarseness occurred on the tenth or eleventh day of the disease. Two or three days after, he made a laryngoscopic examination of the larynx, and discovered a variolous pustule, surrounded with an inflamed areola, upon the upper surface of the anterior portion of the left vocal cord, and two others upon the posterior laryngeal wall, in front of the transverse arytenoid muscle. I have seen them upon the epiglottis, aryteno-epiglottic folds, and upon the ventricular bands. In one case of acute laryngitis accompanying a very severe case of distinct small-pox, aphonia occurred suddenly on the eleventh day, without having been preceded by hoarseness. In order to determine the influence that the trouble in the throat might have on the prognosis of the case, I was asked to examine the case on the fifteenth day, and found that the aphonia was due to paralysis of the arytenoid muscle. The parts in the neighborhood were slightly œdematous. A favorable prognosis removed the doubts of the parties, and was verified by the result. The voice gradually returned during the convalescence of the patient.

---

[1] Gibb, *On Diseases of the Throat and Windpipe*, 2d ed., p. 219.

[2] *Klinik der Krankheiten des Kehlkopfes und der Luftröhre.* Vienna, 1866, p. 180.

In cases of confluent small-pox the involvement of the throat is much more serious. Here the symptoms often begin on the very first day or two of the appearance of the eruption upon the skin. The salivation produced may be very profuse, even amounting to one or two pints of fluid during the day, a quantity altogether out of proportion to the visible amount of local trouble. With this there is excessive thirst, more or less difficulty of swallowing, and more or less pain in expectoration. The participation of the larynx in the local manifestation of the disease is distinguished by cough and more or less hoarseness of voice. Sometimes there is great dyspnœa from œdematous swelling of the aryteno-epiglottic folds and other structures of the larynx, and this has sometimes resulted in fatal suffocation. In a case of variola terminating fatally in this way by suffocation, M. Bernutz found,[1] in addition to marked œdema of the aryteno-epiglottic folds, several ulcerations in the larynx and trachea which had destroyed the mucous membrane, and one which had perforated the larynx.

The injuries inflicted upon the larynx during the course of a case of confluent small-pox may be permanent. In one or two cases examined by the author, years after the attack of small-pox, the larynx appeared in a state of chronic inflammation, and studded with permanently enlarged follicles. There were also little elevations upon the surface of the vocal cords, which were quite red. The symptoms complained of by the patients were constant hoarseness, without pain in vocalization, and a frequent subsidence of laryngeal sound on exertion of the voice, or upon exposure to cold, sometimes amounting to absolute aphonia, lasting from a period of several hours, or a day or two, to several days or a few weeks. The voice in these cases, in addition to its hoarse quality, sounded like that of a tired and languid convalescent; feeble and hesitating, as though the effort to produce it were painful and exhausting. Dr. Gibb[1] relates an interesting case in which one vocal cord appeared to have been destroyed by small-pox; and another in which the patient had been the subject of aphonia, hoarseness, and chronic laryngeal disease for thirty-eight years subsequent to an attack of small-pox. The ventricular bands were very much swollen, and one of them had a small abscess upon it at the time of examination. He also mentions an anatomical preparation from a small-pox case, in which the trachea was studded with distinct elevated spots of coagulable lymph, like the pustules of small-pox.

---

[1] *Gaz. hebd.*, 1868, p. 790.

The Sore Throat of Measles.—The sore throat of measles is a catarrhal affection of the air-passages, including the nostrils, throat, larynx, and more or less of the bronchial tract; a more or less painful coryza and laryngitis therefore, the effect of which is propagated along the lachrymal duct, producing injection of the conjunctival mucous membrane, intolerance of light, and lachrymation. The secretions are viscid and acrid, inducing spasms of sternutation, sometimes attended by rupture of the blood-vessels producing an epistaxis. The Eustachian tubes sometimes become involved in the catarrhal inflammation of measles, and we may have merely moderate deafness, or even marked deafness accompanied by acute pain in the ears.

---

[1] *On Diseases of the Throat.* London, 1864; p. 286.

The mucous membranes of the throat are often affected before there is any manifestation of the disease on the cutaneous surface; and in some instances evidences of the eruption will be found upon the palate a day or more in advance of its appearance upon the skin; and from its appearance upon the palate it can sometimes be defined upon the tonsils and pharynx before it is seen on the external surface.

In cases of severe sore throat attending measles, a membranous exudation is sometimes thrown out upon some portion of the palate or pharynx, and on the upper portion of the larynx. It is less fibrinous than the false membrane of croup and diphtheria, more liable to disintegration, and less equably distributed upon the surface.

The larynx seems to bear the brunt of the throat complication in measles, and in some instances the catarrhal laryngitis is extremely severe, hoarseness of voice persisting, from chronic inflammation of the vocal cords and other intralaryngeal structures, for a long time after subsidence of the original affection. Occasionally the catarrhal condition predisposes the parts to the production of papillomatous excrescences within the larynx, principally upon the vocal cords, or in the ventricles, the same localities in which we find them after membranous croup; and these may be so extensive as to demand surgical interference, otherwise, as in one case which came under the author's observation, they may prove fatal by suffocating the patient.

The Sore Throat of Scarlatina.—The sore throat of scarlatina is, in some instances, the most important source of danger in the progress of the disease, some of the varieties of which have been given names specially designating the anginose and malignant complications.

In the sore throat of scarlatina, the palate and pharynx seem to bear the brunt of the affection, which is often propagated along the Eustachian tubes into the middle ear, producing destructive inflammation of more or less of the structures in that locality. The cases of chronic sore throat, chronic deafness, and chronic otorrhœa which have had their origin in the sore throat of scarlatina are very numerous. The nasal passages are not often invaded in scarlatina, and the larynx very rarely indeed.

Some amount of sore throat is present in every case of scarlatina; indeed, there is reason to believe that there are some very mild cases in which the sore throat is the only manifestation of the disease. It is known that some physicians subject to sore throat are almost certain to acquire an accession of their complaint while in attendance upon scarlatinous cases.

The sore throat of scarlatina, like that of measles, sometimes precedes the cutaneous manifestation. If seen early in the attack, the mucous tissues of the pharynx, in a case of scarlatina simplex, will be of a deep-red color, the palate will be swollen, as also the tonsils, which will exhibit a hue still darker than that of the surrounding structures. A day or two later, there will be found an opalescent or milky accretion upon the tonsils, presenting some resemblance to the false membrane of diphtheria, but differing in color, consistence, and physical characteristics. It is supposed to consist of an intermingling of detached epithelium entangled in an excess of the viscid secretion so often furnished by the tonsils in ordinary inflammations. It is the production of this coating which has caused some practitioners to contend for an analogy between scarlatina and diphtheria. But other than the mere fact of their occasionally simultaneous prevalence, there is no evidence at all of relationship. Still, during an epidemic of diphtheria, the sore throat of scarlatina may become diphtheritic, but not as an essential element of the scarlatinous affection.

As the disease progresses, the throat symptoms become more and more severe, and the cervical glands at the angle of the jaw become swollen and painful. With this, sometimes, the inflammation is attended with effusion into the submucous connective tissue, and thus is produced more or less impediment to respiration and deglutition, but especially the latter; fluids, in swallowing them, often returning by the nostrils. As the violence of the cutaneous symptoms abate, so do those of the throat moderate. The tonsils cast off their adherent secretion, exhibiting a red and sometimes raw surface beneath; the redness of the parts diminishes, and the swellings subside. Sometimes there is a desquamation of an epithelial layer from the tongue and pharynx, similar to the desquamation which takes place from the skin.

In the anginose variety of scarlatina the throat symptoms are more severe than those already narrated. The hue of the palate and pharynx will be more dusky, the color of the membranous secretion of a dirtier white, ash, or even yellowish color, and it will not be so apt to be confined to the tonsils, but will accumulate upon the palate and its arches, and upon the posterior wall of the pharynx, sometimes as far down as this structure can be exposed to view. These patches are soft, and easily removed, and resemble very much in appearance the cacoplasma that is seen on the surface of foul ulcers; and when removed sometimes really do reveal ulcerated and even gangrenous destruction of mucous membrane beneath them. The swelling of tonsils, palate, and pharynx is much greater than that met with in scarlatina simplex; and so is the tumefaction of the cervical and submaxillary glands, which is sometimes so firm and painful as to prevent the patient from properly opening the mouth so as to expose the parts to inspection.

There is an accumulation of viscid secretion in the mouth similar to that seen in measles, and likewise painful to expectorate. Like in measles, too, the nasal passages may become implicated in the disease; and the nasal secretions condense into hard crusts which obstruct the passage of the air, and compel the patient to keep the mouth opened. As the disease progresses, an acrid, offensive, yellow-colored secretion is poured out from the nostrils, sometimes excoriating them in its passage; and the secretions from the mouth assume at the same time a similar character. The symptoms of inflammation of the Eustachian tube are likewise increased in severity.

In scarlatina maligna the sore throat is of that character described as malignant, and this form may commence from the outset, or ensue upon a case of anginose or even simple scarlatina, even after a period of apparent convalescence has become established. It is the knowledge of this liability to become malignant that renders physicians so cautious about committing themselves with regard to the prognosis in any case of scarlet fever, however mild it may be. In addition to an increase in the severity of the symptoms of sore throat described as accompanying scarlatina anginosa, there will be those peculiar constitutional symptoms which are designated as typhoid. The mucous membrane of the throat is very much swollen, of a very dark-red or purple color; there are ulcerations, frequently of a gangrenous character, penetrating the tissue of the mucous membrane; the membranous deposit is much darker in color, almost black, and intermingled with extravasated blood. The discharges are extremely offensive, and are sanious in character, and not infrequently mingled with the products of hemorrhage from some portion of the mucous membrane.

The swellings at the angles of the jaw increase and extend to the neck, and so does the tumefaction internally, so that deglutition becomes impossible, and respiration occasionally impeded to that extent as to demand tracheotomy in rescue from impending suffocation—an operation which may also become necessary on account of œdema of the aryteno-epiglottic folds of the larynx, or of œdema of the epiglottis—manifestations which sometimes occur in connection with œdema of the uvula and soft palate, as an expression of the general condition of anasarca which attends scarlatina as one of its sequelæ.

The treatment of the sore throat of scarlatina will, in the main, be similar to that for the treatment of ordinary inflammatory sore throat, save that the application of severe remedies is rarely called for. The use of sprays propelled into the mouth and upon the affected parts will prove of great efficacy, and can be employed under circumstances in which the mop and the gargle cannot be resorted to. A weak solution of alum is recommended, with the use of detergents, when indicated.

ERYSIPELATOUS SORE THROAT.

Erysipelas occasionally attacks the throat as an extension of erysipelas of the head and face; and in some instances appears to begin in the throat and spread thence to the exterior. When the throat is involved there is imminent danger of implication of the larynx, with the production of œdema.

Sometimes, however, as graphically narrated by Prof. Todd,[1] an idiopathic erysipelas occurs in the throat which is confined to the pharynx. The author has never seen a case of the kind. Several instances of this affection are given by Dr. Todd, who describes them as running their course towards death or recovery within forty-eight hours. The attack usually commences with a catarrh; and the principal symptoms are a dusky-red hue of the pharynx, with inability to swallow; and this inability does not proceed from swelling but from actual paralysis, it being impossible to excite the pharyngeal muscles to contraction even by the contact of the finger or instruments. The regurgitation takes place chiefly through the mouth. The treatment recommended consists in touching the parts lightly with the solid nitrate of silver, or freely washing them with a strong solution of the same; and in the frequent injection of enemas of beef-tea containing large doses (10 grains) of quinine. Improvement usually begins in from twenty-four to forty-eight hours, and as soon as the power of deglutition commences to return, frequent and large doses of brandy, ammonia, chloric ether, and beef-tea are given by the mouth.

A case of pharyngeal erysipelas making its way on the face through the lachrymal canal has been recorded[2] by M. Gallard. A female, twenty-five years of age, was taken ill, March 13th, with chill, fever, pain in the throat, difficulty in swallowing, and great swelling of the glands of the neck and of the lower jaw. The symptoms increased until the 17th, when the pain in the throat subsided, but was followed by burning pain in the nostrils. On the 18th there was pain at the inner angle of the right eye, with redness and swelling of the lower lid, which in the course of the day continued along the naso-labial sulcus and extended to the line of the border of the jaw; these symptoms being attended with severe fever and repeated vomiting. On the 20th there was redness and swelling of the left cheek commencing over the inner eyelid; and the mucous membrane of the pharynx was only still much injected. The erysipelas spread from the nose and chin, and united upon the forehead on the 22d, whence it extended over the anterior third of the hairy scalp, and formed blisters here and there, and on the next day redness and swelling disappeared for the first time from the right cheek, and on the following days from the other portions. On the 29th the patient was well.

---

[1] Clinical Lectures on Certain Acute Diseases, Phila. Ed. 1860, p. 151.

[2] (*Gaz. des hôp.* 47, 1868) Schmidt's *Jahrb.*, Jan., 1869, p. 35.

Another case was reported[1] by Rigal, in which the erysipelas of the pharynx extended into the nasal passages, and thence over the conjunctivæ and the face.

---

[1] *Gaz. des hôp.*, 1869, 20.

CHAPTER VI.

SYPHILITIC SORE THROAT.

THIS affection is very common in every large community, usually as a symptomatic manifestation of systemic poisoning produced in the usual way; but sometimes the result of direct poisoning from chancres about the lips, tongue, and hard palate, produced by actual contact. Secondary symptoms are sometimes communicated by the kisses or bites of infected individuals; they have been known to follow the drawing out of the nipple of the parturient female, by suction with the mouth of a syphilitic nurse. In children it is sometimes contracted from the nipple of the nurse. Some observers have thought that it could be communicated to the mouth of the infant through the medium of the milk, but it must be exceedingly doubtful that infection is ever brought about in this way. It is also occasionally propagated by the use of certain instruments placed in the mouth, such as the blowpipe, trumpet, etc. I have known it to be communicated by the incautious use of the Eustachian catheter, a fearful case of ravage from which was shown to me several years ago by my friend Dr. R. J. Levis, of Philadelphia.

The chancre met with on the lip and tongue is usually of the hard variety; still, soft chancre is also encountered, and I have seen cases where, both lips and tongue being involved, a considerable portion of the latter organ was the subject of extensive phagedenic ulceration, presenting a most horrible and disgusting spectacle.

The only affections with which chancre in the lips and tongue could be confounded are, perhaps, epithelioma and furuncle; but the appearances of the latter are so characteristic that, taken in connection with the sort of individual likely to be the subject of chancre about the mouth, a mistake in diagnosis is hardly possible. These cases are not seen early as a usual thing; for shame on the one hand, and ignorance on the other, are likely to deter the patients from applying for medical treatment until they find it absolutely necessary, in order to control the ravages of the disease.

Syphilitic diseases of the throat are much more likely to appear as manifestations of secondary and tertiary syphilis, though the characteristics of the two forms are not as well defined as when occurring in other parts of the body. Where the former existence of a primary affection is acknowledged, the duration of the affection will be an important element in the discrimination, as also the evidence of syphilitic disease in the skin; the usual period for secondary manifestations being from four to eight weeks from the date of infection. Of these syphilitic affections of the throat, some are similar to those met with on the cutaneous surface, and others are peculiar to the mucous membrane.

The most frequent seat of syphilitic inflammation of the throat is, perhaps, the soft palate; beginning usually near the border of the hard palate and spreading downwards upon either side, though sometimes travelling along the hard palate also. We do not often see separate blotches such as are observed upon the skin, but rather a diffused redness without any distinct line of demarcation. This erythematous condition gradually extends to the arches of the palate, and presents the appearances of ordinary inflammation. Sometimes it is distributed in irregular patches, separated by healthy-looking membrane. Should the disease not have been arrested at this stage, there ensues a swelling of the affected parts, with a gradual change to a livid color. The movements of the palate become impeded by the interstitial deposit going on in its tissues, occasionally amounting to complete paralysis. The tonsils are very apt to be involved, becoming somewhat swollen, though not often markedly so; but they are red, hard, irregular in outline, and soon become covered with a pasty secretion that often adheres in strands to their lacunæ. These hypertrophied tonsils are sometimes the seat of condylomata, and if careful investigation be made, the coexistence of similar vegetations elsewhere will often be revealed. The follicular glands of the palate and uvula become enlarged and prominent, and the uvula often markedly œdematous.

Should the progress of the disease not be arrested in this stage, the inflamed follicles of the palate and of the tonsils ulcerate; and the ulcers run into each other and often extend rapidly, the gums, tongue, and epiglottis sometimes participating. These ulcers are soft, covered with grayish aplastic deposit, sometimes pellicular, and are usually excavated, with sharp edges, and surrounded by a demarcating border of reddened membrane. They are at first superficial, but soon involve the entire mucous membrane and penetrate into the submucous tissue. Sometimes abscesses form, principally in the palate, and in the tonsils and palatine folds: and these finally discharge, leaving foul ulcers, chiefly at the root of the uvula, which is sometimes destroyed in the ulcerative process; but they also occur in other portions, and often penetrate the entire thickness of the palate in their ulcerative ravages; sometimes in its central portion, sometimes to one side or the other, and not infrequently comparatively large portions of the arches are destroyed in consequence. This destructive process sometimes proceeds with great rapidity, a period of twenty-four or forty-eight hours sufficing to complete the perforation. The ulcerated tonsils bleed readily to the touch, and may undergo entire destruction. During this time the pharynx becomes equally involved; in many instances ulceration being produced, so that very often there is formed, in cicatrization, an adhesion between the sides of the palate, or its posterior arch, and the wall of the pharynx. The ulcerative process sometimes extends to the cervical vertebræ, and produces exfoliation of dead bone. The tongue, gums, lips, and cheeks also participate in the affection, so that there is ulceration of all these parts at once, or in prompt succession. From the pharynx, or from the posterior portion of the velum, the diseased process extends to the orifices of the Eustachian tubes, and, not infrequently, continues along the tube into the tympanum. The inflammation thus excited may even be propagated to the inter-cranial tissues proper; though more frequently rupture of the membrana tympani ensues, giving vent to discharges of purulent matters through the external ear. The mucous membrane of the nose is also attacked, and may implicate the nasal duct producing specific inflammation of the conjunctival mucous membrane; and the disease in many instances extends to the larynx, which is also often affected primarily. The affection of the nasal mucous membrane may extend to the bones, and produce caries and necrosis. Sometimes the disease of the bones precedes the implication of the mucous membrane.

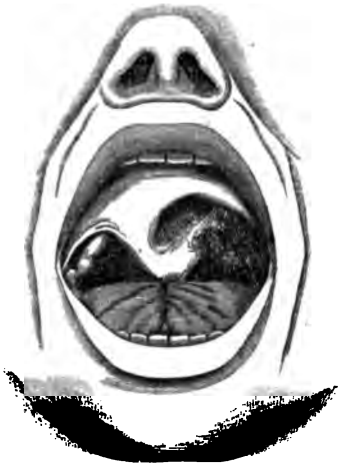
The larynx becomes involved by extension of the disease from the anterior arches of the palate usually, and all the phenomena of syphilitic inflammation may ensue, leading to extensive ulceration and destruction. The epiglottis is quite prone to suffer; and there may be great loss of its substance, or even entire loss of it. The syphilitic ulcerative process attacks the aryteno-epiglottic folds, the ventricular bands, and the vocal cords; sometimes singly, sometimes together. This ulceration may extend to the cartilages, and produce their destruction; or the disease may begin in syphilitic perichondritis or chondritis, and affect the mucous membrane in the exfoliation of the sequester. Large portions of cartilage are sometimes destroyed, and even entire cartilages. During this process, œdema of the larynx is very apt to take place. The cicatrization of laryngeal ulcers often produces permanent constriction of the laryngeal orifice, and sometimes, even if the glottis is not directly implicated, necessitates the operation of tracheotomy, with almost always the permanent use of the canule.

The trachea also is liable to the manifestations of syphilis; and the ulcerative process may involve its cartilages as well as its mucous membrane.

Syphilitic warts and excrescences are liable to form in the larynx. They are frequently small, multiple, and adherent by a broad base; but they may acquire the size of a hickory-nut, almost filling up the upper cavity of the larynx. Sometimes they are flat bands hanging into the glottis, or from the vocal cords. They may occupy any portion of the larynx.

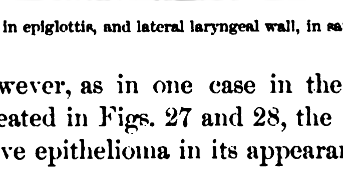
There is nothing absolutely characteristic in the appearance of syphilitic disease of the larynx, whether of the simple erythematous form, or of the ulcerative variety. An obstinate chronic laryngitis in a constitution undoubtedly free from tuberculous disease of the lungs is almost presumptive evidence of its syphilitic nature. And the same may be said of the ulcerative form, if it can be traced to no other actual cause. There are some cases which simulate cancer in their appearance, but the absence of the lancinating pains attending malignant disease will usually serve to eliminate the latter from the diagnosis.

Fig. 27.



Syphilitic ravages in the soft palate, tonsil, and lateral pharyngeal wall.

Fig. 28.



Syphilitic ravages in epiglottis, and lateral laryngeal wall, in same case as Fig 27.

Sometimes, however, as in one case in the practice of the author, and delineated in Figs. 27 and 28, the disease not only simulates ulcerative epithelioma in its appearances, but even in the lancinating pains, which, in the instance referred to, were constant, much more constant than is observed in cancer; causing the patient, a man aged 31 years, to twitch his head towards the side affected every few seconds from morning until night, whether talking, eating, or at rest; and this for weeks together; for he did not come under observation until a late period of the affection, after the disease had committed the ravages depicted in the illustrations,[1] ravages which finally destroyed the entire palate and epiglottis.

The mucous tubercle, as it is called, a peculiar affection in irregular elevations, hard to the touch, resembling in appearance a portion of surface which has been subjected to the local action of nitrate of silver, is often seen upon the mucous membrane of the throat. It is thought to be due to the ulcerative action of a gummy deposit which has existed in the submucous tissues. It is liable to produce extensive ulceration and destruction of tissue. Its most frequent seat is the tongue, lips, inside of the cheek, and the soft palate.

The treatment of consecutive syphilitic affections of the throat is very simple, and, if the constitution has not been broken down, usually successful, even when the local disease is very severe. The patient, if not well nourished, should be given wine, iron, and quinine, and good nutritious diet, until his general health has become somewhat re-established, when he should be placed upon specific treatment. This will consist, usually, of iodide of potassium; aided, if need be, by the bichloride of mercury, or some equivalent mercurial preparation, in small doses. Locally, swabbing the parts with the acid nitrate of mercury, diluted with four, ten, or twenty parts of water, as circumstances may indicate, will usually be found fully efficient as a topical remedy. If œdema be present the parts must be scarified, or ruptured by compression; after which a solution of the nitrate of silver may be employed upon them. Should the œdema recur, it must be treated as before. Should symptoms of suffocation supervene which cannot be subdued by less severe measures, the performance of tracheotomy is indicated. Astringent applications in the form of spray, or washes, should be freely used by the patient if there be a great deal of discomfort from swelling and inflammation of the parts. Fetor is controlled by the local use of detergents in the same way.

---

[1] See in this connection a case of inherited syphilis of the nose simulating epithelioma. Prof. Gross' Clinic, May 27, '71.—*The Med. Times*, Phila., July 15th, 1871.

The earlier manifestations of syphilitic sore throat usually demand no other treatment than destruction of the primary ulceration by the acid nitrate of mercury or other caustic, followed by such treatment, local and constitutional, as would be employed in non-specific inflammatory sore throat.

SYPHILITIC SORE THROAT IN INFANTS.

The constitutional manifestations of syphilis in the throat of the infant present usually in the form of mucous patches. These occupy the palate, its arches, the tonsils, and sometimes the pharynx; and occasionally the larynx also seems to be affected, judging from the hoarseness of the infant's cry. At the same time the mucous tissues of the mouth may be implicated, such as the gums, lips, tongue, and inside of the cheek. Much more frequently, however, the disease manifests itself in the form of a coryza, which is, probably, in accordance with the opinion of Diday and others, due to the development of mucous patches upon the mucous membrane of the nose. The first evidence of the disease is some impediment to free respiration by the nostrils, and consequent embarrassment in taking the nipple; the symptoms being similar at first to those of an ordinary coryza. After a short time, a thin serous liquid runs from the nose, which soon becomes thicker, purulent, and somewhat sanguinolent. The nose becomes more and more stopped up, and as this condition increases, the child, while suckling, is forced to take rapid inspirations through the nose, which dries up portions of the secretions into crusts, which are discharged with more or less hemorrhage. Finally these crusts accumulate faster than they can be discharged, and complete obstruction of the nostrils is produced. When this is the case, great difficulty is experienced in nourishing the child, because it is unable to breathe while at the nipple. It seizes the breast eagerly, but is compelled to let it go again almost immediately, which renders it cross and fretful. As the disease progresses, specific pustules, fissures, and ulcers form upon the alæ of the nose and upon the lips, and at the angles of the mouth, and extend outwards upon the cheek along the natural fissures of the skin. In this manner, sometimes, peculiar striated appearances are produced, which, according to Prof. Trousseau,[1] are characteristic of syphilis, and are true mucous crusts, though not exactly of the same aspect as in the adult; their size being smaller the greater their distance from the mucous membrane of the lips: their edges are finely fringed and blackened by the adherence of coagulated blood; and they have gristly and bleeding bottoms more or less bright red in color.

Prof. Trousseau states that they often leave indelible cicatrices after recovery, and that he has seen young men and young women still carrying these cicatrices; stigmata, the nature of which they did not suspect.

As the disease of the nasal passages progresses, ulceration takes place there also, and it often destroys the cartilages and the bones, fragments of which are thrown off with the crusts. In this way the septum becomes perforated, and the nose flattened. Sometimes the general system is poisoned by the exhalations of the decomposing secretions in the nose, and death ensues in consequence. This syphilitic coryza is sometimes the only manifestation of hereditary syphilis, and, according to Trousseau, the earliest sign of the disease in almost every instance.

The treatment of syphilitic diseases of the throat in the infant does not differ essentially from that adopted in the treatment of syphilis in the adult. Care must be taken to sustain the nourishment of the child and to place it under favorable hygienic influences. To this end a healthy wet-nurse is a great desideratum, but one not always to be obtained. It is stated on good authority, that a syphilitic wet-nurse is admissible provided she is placed under specific treatment, that is to say, mercurialized. When the child cannot be nursed, the milk of the goat, the ass, or the cow is administered by the bottle if the child can take it, otherwise by the spoon, the same as under ordinary circumstances. The child should be kept in a warm temperature, be clad with woollen underclothing, and great care should be taken in maintaining cleanliness of the skin and in prompt removal of the secretions. Ablutions should be practised more frequently than with the healthy infant. A mercurial course appears to be indispensable, and the best article for this purpose is, as with the adult, the bichloride of mercury, which may be given in solution with syrup, in divided doses, varying from one twelfth of a grain daily upwards until some sign of inflammation is observable upon the gums, or until the characteristic odor is perceptible in the breath, when the quantity of the mercurial may be slightly diminished, but not to a greater extent than is necessary to keep up evidences of its specific effect. The mercurialization may be assisted by frictions to the chest of the mild mercurial ointment, or by the method of Brodie, which is to smear a flannel jacket with the ointment and wrap it around the thorax, trusting to the natural movements of the child for its friction into the skin. In some instances a bath is mercurialized by dissolving half a drachm of the bichloride of mercury in it, and employed every two or three days, according to the indications. If the mercurial should irritate the intestinal canal, its administration by the mouth is suspended for a while, and more attention paid to its use by the bath. In addition to the mercurial treatment, the iodide of potassium is administered in some pleasant syrup, in doses from three-fourths of a grain and upwards, according to the age and strength of the patient and the promptness of its effects.

---

[1] *Clinical Lectures.* Vol. iv. Sydenham So. Ed.

Local treatment is also called for. The mouth may be swabbed out with honey impregnated with muriatic or sulphuric acid, or with alum or borax. If this should not suffice, the diseased parts may be gently touched with the nitrate of silver, in stick or in solution, great care being taken not to make too extensive an application; and this may be repeated every two or three days, according to the indication.

For the affections of the nasal passages, the syringe should be employed several times a day, to facilitate the removal of the crusts, and to medicate the diseased structures. Warm water impregnated with the bichloride of mercury, chlorinated soda, chloride of lime, or carbolic acid, may be employed for this purpose. Ointments containing the mercurial may also be applied by means of a soft mop or feather.

CHAPTER VII.

SORE THROAT FROM BURNS AND SCALDS.

Burns and scalds of the throat are often met with, usually the result of accident, but sometimes the result of design. They are often fatal. The most frequent sufferers from scalds are the children of the poor, who, being allowed to run about the kitchen, attempt to drink water boiling in the tea-pot. Sometimes acid or alkaline caustic substances are swallowed, a liniment being mistaken for a mixture. Another class of cases occur when caustic substances are swallowed in suicidal intent. Burns occur most frequently from the inhalation of flame, hot steam, or the heated air of burning buildings. Where flame or hot air is inhaled, or where hot or caustic liquid is swallowed involuntarily, the larynx is much more likely to be implicated than when the drink has been taken designedly, and the epiglottis not surprised at its post, as it were; and the effects are produced principally in the pharynx and œsophagus. When the larynx has been injured, acute laryngitis rapidly supervenes, and is likely to be attended with œdema, and thus produce death by asphyxia. Tracheotomy is therefore demanded early, as a rule, after accidents of this sort; but it does not hold out the hope of success in children that it does in adults.

There is usually little trouble about the diagnosis of a burn or scald in the throat. The severe pain and distress in the part, the dyspnœa and dysphagia, and the history of the case are sufficient for the purpose. The mouth, palate, and pharynx, if seen early, are white; patches of the mucous membrane are destroyed, and there is abundant evidence of inflammatory swelling. The nervous shock is usually very great, and forms one serious element of danger.

The treatment consists in the administration of anodynes hypodermically and by inhalation, nourishment and stimulation by enema, and the local application of bits of ice in the mouth, with cold compresses or ice-bags about the neck; to which is to be added the performance of tracheotomy on the supervention of symptoms of suffocation. Suppuration is very great, should the patient survive; and chronic laryngitis usually remains, sometimes with stenosis of larynx or trachea, and stricture of œsophagus. These results are to be treated according to the indications laid down under their respective heads.

When smoke is inhaled during the conflagration of burning buildings, black sputa are sometimes expectorated for several days. I have elsewhere instanced[1] a number of cases which occurred in a family living over a perfumery store which took fire. Ten of them, who came under the care of Dr. W. W. Keen, Jr., and myself, were attacked with severe bronchitis and aphonia; and, for several days subsequent to the accident, expectorated large quantities of black sputa, which were nothing more nor less than the carbonaceous matters they were forced to inhale before they could be rescued from the flames. In one of these cases there was œdema of the larynx threatening suffocation. Copious and frequent inhalations of the spray from a solution of the watery extract of opium, relieved the suffering, and the patient eventually recovered.[2]

---

[1] Inhalation; its Therapeutics and Practice. Phila., 1867, p. 294.

[2] *Ibid.* p. 139.

CHAPTER VIII.

SPECIAL AFFECTIONS OF THE TONSILS.

Foreign Bodies, such as fish-bones, bristles from a tooth-brush, and the like, occasionally stick in the tonsils. They may be readily removed by the forceps. If deeply buried, an incision may be made over them, so as to render their extraction more easy.

Calcareous concretions are sometimes met with in the tonsils. They vary from the size of a small seed to that of a large bean or a small nut. They often produce cough and excessive secretion; sometimes inflammation and abscess. Sometimes they project from the surface of the organ and can be removed by the forceps, aided, if need be, by one or two light strokes with the knife. Small concretions are occasionally ejected spontaneously in a fit of coughing or vomiting; and some patients are subject to recurrences of this kind. These concretions are usually composed in great part of carbonate and phosphate of lime, and seem often to be produced from calcification of the cheesy masses so frequently met with in the tonsils. Under these circumstances, when crushed, they emit the same offensive odor as the masses alluded to. Under other circumstances they resemble the concretions sometimes expectorated from the lungs of tuberculous subjects, and have not the slightest offensive odor about them.

Cancerous tumors occasionally occur in the tonsils. Under these circumstances the entire organ must be removed, if at all subjected to operation; and if the membranes of the soft palate or pharynx are involved, portions of these structures also, including a sufficient zone of healthy tissue.

Cystic tumors have been seen in the tonsils. They have usually been discovered during an operation for a supposed hypertrophy. The contents of the sac are of course evacuated by the operation; and an injection of iodine, or some analogous procedure, should be employed to excite adhesive inflammations of its walls.

PERMANENT (CHRONIC) ENLARGEMENT OF THE TONSILS.

Hypertrophy of the Tonsils.—Hypertrophy of the tonsils is very often met with, usually in children and young adults. In some instances the affection appears to be congenital; at least it has been noticed soon after birth. It is very rarely encountered in persons over thirty years of age, unless the condition has existed for a number of years. Most of the cases occur in persons of the strumous diathesis, and often in connection with other manifestations of this condition of system, though cases are sometimes met with in individuals with no other evidence of scrofula.

As a usual thing, there is a history of successive attacks of sore throat during which the tonsils have been swollen, each attack leaving them larger than before; but sometimes there is no history of this kind, and we are led to the conclusion that the affection has been chronic from the start. A moderate degree of hypertrophy produces no unpleasant symptoms, except while the patient is suffering from sore throat, when the swollen glands interfere with deglutition, and sometimes with respiration.

Great hypertrophy will interfere with free nasal respiration, and necessitate more or less coarse breathing through the mouth, and thus induce dryness of the throat. It also produces a peculiar clang in the voice, and gives rise to snoring during sleep.

The affection is recognized at a glance by inspecting the throat. The enlargement may vary from a mere projection of the glands beyond the arches of the palate, to an hypertrophy so great as to hide most of the pharynx, the tonsils being of the size of large walnuts, and touching each other. In some instances they have been known to become adherent. Mere inspection does not always reveal the whole of the enlargement, and when the entire circumference cannot be seen, the finger should be employed in examination, when the gland will often be found enlarged above and below, in the former instance sometimes pressing the palate against the pharyngeal orifice of the Eustachian tube, and thus, perhaps, adding impairment of hearing to the usual symptoms of difficulty in deglutition, respiration, and articulation. The enlarged tonsil is often adherent to the arches of the palate to a greater or less extent.

The enlargement of the tonsil is not due to a growth of its glandular structure, but rather to the deposit of fibrinous material within its structure, which material undergoes organization and adds to the size of the organ.

Both glands are usually hypertrophied, but not always to the same degree. Sometimes but one organ is affected, and cases of this kind are not infrequently connected with incipient pulmonary consumption, as pointed out by Dr. Green and others, the affection in the lung showing itself on the same side as that on which the enlarged tonsil exists. I have frequently observed an enlarged and ulcerated tonsil in cases of tuberculosis, and almost invariably on the same side as that in which disorganization was progressing in the lung.

The treatment of hypertrophied tonsils is both constitutional and local. The constitutional treatment consists in the use of nutritious diet, careful attention to the skin, bowels, and kidneys, and the use of cod-liver oil and the vegetable tonics. Iron also is often indicated. If the general health is good, remedies may be employed with a view to promote absorption, such being muriate of ammonia, sulphate of potassa, iodide of potassium, and the like. Where the condition is of comparatively recent standing, the enlargement moderate, and of soft or elastic consistence, constitutional treatment will often be adequate to their reduction, especially in cases of young children. In addition to constitutional measures, local treatment can be employed, such as the use two or three times a week of solutions of nitrate of silver, tincture of iodine, iodide of zinc, glycerole of tannin, recent ox-gall, and so on; the milder remedies being applied night and morning by the parent or nurse.

At the same time frequent compression of the gland between the fingers of each hand—one upon the tonsil, and the other outside of the throat—assists the process of absorption.

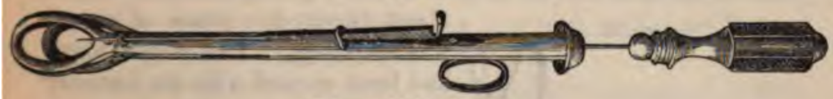
Where the tonsils are very much enlarged and very hard, local treatment will not often be of avail, and excision must be practised. This consists in the removal of as much of the tumor as projects beyond the arch of the palate. When the organ is not very large, it may be excised by the tonsillotome of Physick, Fahnestock, or others, which is the method in general use. It possesses the disadvantage of inability to practise the excision exactly as may be desired, leaving very often a misshapen stump behind.

A much more satisfactory plan consists in drawing the enlarged gland out from its bed by means of a double vulsellum, and cutting it with a large probe-pointed bistoury from above downwards and from behind forwards, as it is drawn obliquely into the cavity of the mouth. The danger of wounding the carotid artery, which is often referred to in this connection, does not exist, inasmuch as the organ is pulled away from the side of the throat, and other structures intervene between this vessel and the tonsil. It can only occur when an awkward attempt is made to excise the entire gland, a sacrifice which is hardly ever necessary. It is sometimes requisite to remove the entire gland, in cases where it hangs loosely in the throat by elongated attachments, and danger is then avoided by keeping the knife as close as may be to the diseased gland.

When the patient co-operates with the surgeon the operation is very readily accomplished, but when struggling occurs it is often exceedingly embarrassing, from the difficulty of following the course of the knife by the eye.

On account of the difficulty encountered in excising an hypertrophied tonsil, especially in cases of refractory children, a special instrument for this purpose was invented by Dr. Physick and Dr. Fahnestock. Fahnestock's tonsillotome, Fig. 29, has had a more extended use, perhaps, than any other special instrument in surgery. It consists of a circular knife concealed within a ring which is placed over the enlarged tonsil, which is then transfixed by being pierced with a sharp-pointed prong which slides on the shank of the instrument. The handle attached to the knife is then drawn home, slicing off a portion of the gland, which is removed with the instrument.

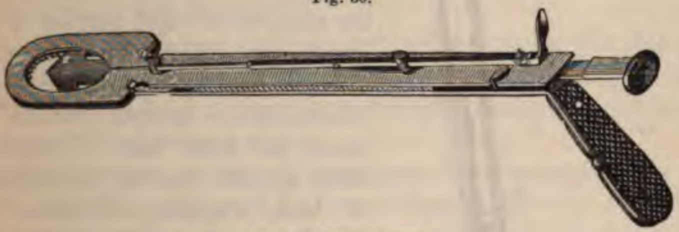
Fig. 29.



Fahnestock's Tonsillotome.

In the tonsillotome of Dr. Physick, Fig. 30, a broad-bevelled knife is pushed forward into the ring, a method which prevents dragging the tonsil forward by its attachments, as sometimes occurs in the use of other instruments. It can be used with one hand.

Fig. 30.

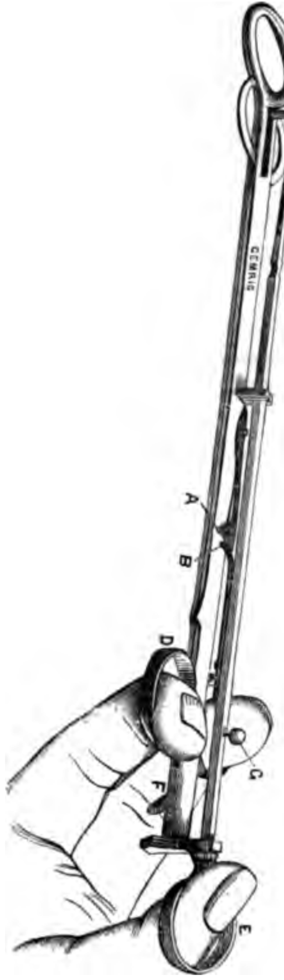


Physick's Tonsillotome.

An instrument, Fig. 31, devised in France, and much used in this country, is provided with a mechanism by which the tonsil is lifted from its bed to the desired extent before the knife is drawn home; the entire operation being performed with one hand, and in one movement, the fork having been set to the desired height beforehand.

Although the tonsil is richly supplied with blood, and from several vessels of tolerable size, the hemorrhage following excision is usually inconsiderable, and soon ceases spontaneously, or upon the application of ice, or of a saline or acid solution. There are several records of more than a thousand operations at the hands of a single surgeon, without the occurrence of any serious hemorrhage. On the other hand, there is no doubt that hemorrhage sometimes takes place to an alarming extent, and cases are on record where it has proved fatal. Hemorrhage in the case of young children is a very serious matter, on account of the difficulty of controlling the child so as to facilitate efforts for its arrest. I have seen a great deal of hemorrhage in several cases, and in one in particular, a young married lady of about twenty-five years of age, it was alarming. The larger tonsil had been excised with the bistoury with comparatively little bleeding, so little that the excision of the other one was proceeded with immediately. As I cut into this, the hemorrhage was at once so profuse as to conceal the field of operation from view; but the excision was completed as rapidly as possible, and by the time the divided portion of the gland was withdrawn—less time than it has taken to narrate the circumstance—several ounces of blood had been lost. I immediately applied the dry persulphate of iron, slapping it upon the bleeding surface with my fingers, which held it there with some difficulty on account of the struggles of the patient to eject the blood streaming into her mouth. Shortly after the hemorrhage was controlled, the patient fainted. She was placed prone on the floor and soon recovered. Upon examination, a few minutes after the administration of some alcoholic stimulant, I found that I had not removed the lower portion of the tumor, having cut the knife out just above it. With some persuasion the patient permitted me to remove this portion, but no bleeding followed it. I was subsequently informed by the

Fig. 31.



Charrière's Tonsillotome.

physician who had brought the patient to me, that secondary hemorrhage took place a few days after, which necessitated a renewal of the application of the persulphate of iron. A few weeks afterwards the patient called upon me perfectly well, but she had not yet recovered the rosy complexion she had before she made my acquaintance.

In other cases I have found the operation almost a bloodless one.

On account of the danger of hemorrhage, which is not at all avoided in the use of the tonsillotome, it has been proposed by Chaissagnac to remove the gland by means of the écraseur. Some surgeons who have attempted this have found it difficult to fix the gland so as to insure the division of sufficient of its substance, and the drawing of nothing else within the grasp of the instrument.

Prof. Gross has recently devised an instrument for this purpose on the principle of the tonsillotome, substituting a chain for the knife; but it seems suited chiefly for cases in which the hypertrophy is very great.

Maisonneuve devised an instrument for removal of the tonsils, consisting of an écraseur of twisted wire.

Attempts have been made, and with success, to destroy the exuberant portion of the tonsil by means of caustics. Nitrate of silver is inadequate and too slow in its action. The Vienna paste has been used, but it is very painful, and cannot be kept from other tissues except by means of a special contrivance which is not always at hand. Dr. Morell Mackenzie, of London, has had a great deal of success with the use of the London paste, which is composed of equal parts of caustic soda and hydrated lime, a portion of which is moistened with water at the time of its employment. Dr. Mackenzie makes the application with a rod of aluminium wire, but Dr. Ruppaner,[1] of New York, has made the valuable suggestion of using a glass rod for the purpose. I have employed this method, and sometimes found it available, but find that the operation needs to be repeated many times, only a small slough being removed after each application. It has the merit of being much less painful than the application of the caustic potash or the Vienna paste, and of being followed by less inflammation.

---

[1] **On the Removal of Enlarged Tonsils without Cutting. With 123 cases.** ***Med. & Surg. Rep.*****, Phila., 1869, Nov. 20, 27.**

Prof. Donaldson, of Baltimore, informed me quite recently that he has had a good deal of success in the treatment of enlarged tonsils by making small incisions into them, and then holding a crystal of chromic acid in the cut for some moments. This method he prefers to that recommended by Dr. Mackenzie.

The galvano-cautery may be employed for the purpose of removal by a single operation, the tumor being first encircled by a snare of platinum wire, which is drawn as tightly as possible, as soon as the electric current is allowed to traverse it.

In a few instances of soft enlargements of moderate dimensions, where the patients refused to submit to operative procedure, I have succeeded in reducing the glands by electrolysis, employing a long platinum or gold needle, with an isolated handle, in connection with the negative pole of a battery of from ten to forty small cells, the positive pole being in connection with a sponge-electrode held outside over the tonsil, or in some instances upon the surface of the gland in the mouth. A number of operations—ten to twenty—are necessary for the accomplishment of this purpose; and in some of the cases, the results were not worth the trouble of the performance.

I must say that I prefer excision by the knife, and usually resort to it. The operation is facilitated, in certain cases, by first detaching the gland from the arches of the palate to which it has contracted adhesions. These bands of tissue can sometimes be ruptured with the probe, or some similar blunt instrument. This enables the gland to be drawn out from between the arches before the excision. In cases of moderate enlargement with adhesions, the simple release of the gland, if properly maintained, will occasionally assist its reduction by other measures without resort to the knife.

CHAPTER IX.

SPECIAL AFFECTIONS OF THE PALATE AND UVULA.

THE palate participates very frequently in various affections of the throat, in consequence of the intimacy of its connections with pharynx, tonsils, nares, larynx, and œsophagus. Recent researches have developed some new points in connection with the musculature of the soft palate, which have a great interest in reference to the physiology of deglutition, and occlusion of the upper or pharyngo-nasal portion of the pharynx, and consequently on the pathology of dysphagia.

Inasmuch as these observations have not yet been generally introduced into our works on anatomy, a brief description of their special points will hardly be out of place.

THE PHARYNGO-PALATINE MUSCLES.

Merkel[1] describes both of the pharyngo-palatine muscles as crossing in the middle line of the posterior wall of the pharynx, and then each of them coursing further on the opposite side, to unite with the upper fibres of the inferior constrictor muscle of the pharynx; and further describes them as taking part in the function of the constrictor muscle. A sort of sphincter is thus formed, which can shut off the nasal portion of the pharynx; and Merkel considers these two pharyngo-palatine muscles as forming a circular muscle, similar to that of the orbicularis oris, and other circular muscles of the body which have no firm points of insertion.

Luschka[2] has recently studied the whole subject anew, and, while referring to the author just named, and to several other authorities, considers the pharyngo-palatine muscles of each side to form a whole, which, in addition to the function of assisting in shutting off the naso-pharyngeal portion from the lower portion of the pharynx, also possesses the function of shortening the pharynx, and raising the larynx in a considerable degree. Luschka recognizes a thyroidal portion and a pharyngo-palatinal portion of the muscle under consideration, and designates it as the musculus thyreo-pharyngo-palatinus.

---

[1] *Anatomie und Physiologie des menschlichen Stimm- und Sprachorganes.* Leipzig, 1863, pp. 217–224.

[2] Virchow's *Archiv*, March 18, 1868, p. 480–489, with illustrations.

The main points of Luschka's description may be thus summed up:

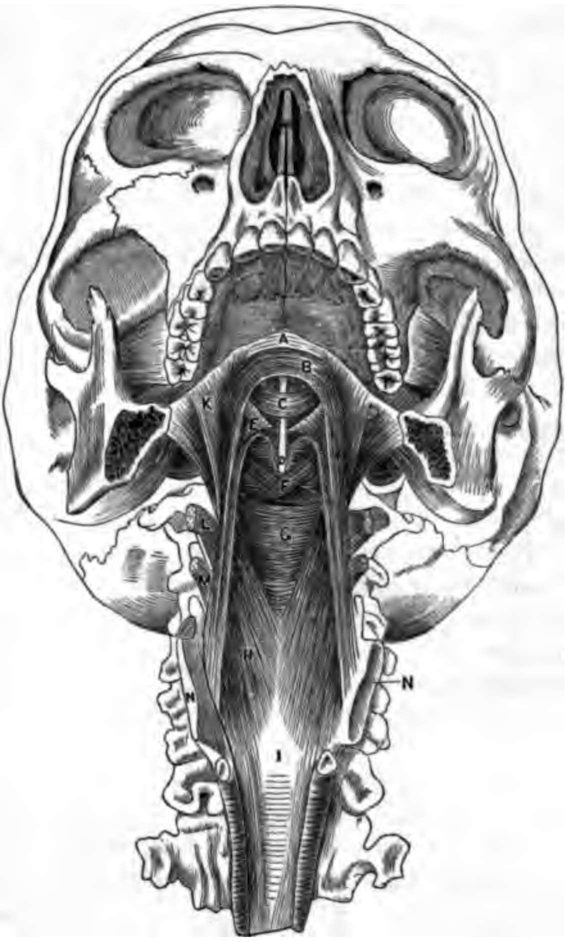
The Thyreo-palatine portion of the Thyreo-pharyngo-palatine Muscle.—The upper end of the thyreo-palatine portion of the muscle, contained in the soft palate, lies partly in front of the levator palati and partly behind it; its fibres in part also intertwining with the substance of the levator itself, by which each end is in a measure separated into several strata. Most of the fibres are in front of the levator, forming a compact arched flattened bundle, whose convex border is connected firmly with the aponeurosis of the hard palate, a continuation, as it were, with that of both of the tensores veli, while its concave border is attached to the arch of the levator palati. The fibres lying behind the levator palati muscle form several bundles of different thickness, loosely connected, which become more and more delicate as they approach the free border of the velum, and, without forming an arch, are in part connected with the aponeuroses of the palate, in part to a sort of median raphe-like thin prolongation of the aponeurosis, reaching its tendinous termination behind the azygos uvulæ. The combination of fibres enclosed in the soft palate draw themselves together, downwards and outwards, and at the same time in a direction backwards, more and more into a roundish flat cord, becoming gradually thinner towards its borders, which courses down in the pharyngo-palatine arch behind the tonsil, along the bend formed by the posterior and lateral walls of the pharynx. The bundle which takes a more forward position at the base of the soft palate, courses in a direction more and more horizontal as it descends, and finally comes again to the front. These muscular bundles take a short partial attachment on the posterior border of the thyroid cartilage, below its upper horn. The outer bundle here associates itself with the outer portion of the stylo-pharyngeus muscle, which is inserted principally in the upper corner of the thyroid cartilage, a few delicate fibres stretching out beneath the mucous membrane of the recessus pharyngo-laryngeus. Not a few bundles of the pars thyreo-palatina neither remain true to the original direction, nor attach themselves to the thyroid cartilage, but course medianwards to the posterior wall of the pharynx, where they form a long layer of fibres, directly under the mucous membrane, in connection with the bundles of the pharyngo-palatine portion of the musculature, which layers become thinner and thinner as they reach the middle line, and end in a sort of aponeurosis which loses itself in the œsophagus as a lax layer of connective tissue.

The Pharyngo-palatine portion of the Thyreo-Palatine Muscle.— Close by the arched portion of the pars thyreo-palatina, this portion of the muscular apparatus commences in a flat bundle, at first diagonally placed and gradually taking a direction forwards; arising partly from the aponeurosis of the circumflex palati mollis, and partly from fibrous tissue which encloses the convex circumference of the hamular process of the pterygoid plate, so that it is connected with adjacent immovable points of origin. It is strengthened by the salpingo-pharyngeus muscle arising from the cartilaginous portion of the Eustachian tube.

During its course downwards and inwards it shows itself so behind the thyreo-palatine portion, coursing outwards, that both portions cross each other at a very sharp angle in the neighborhood of the lower portion of the tonsil. The fibres then course more and more towards the middle line of the posterior wall of the pharynx, where its aponeurotic expansion not only becomes connected with the fibres from the thyreo-palatine portion attached to the thyroid cartilage, but is also spread out between the two lower horns of this cartilage. This aponeurosis, which can be readily isolated from the lower constrictor, is gradually lost in a lax web of connective tissue which passes over the submucous tissue of the œsophagus.

The accompanying cut (Fig. 32), copied from Luschka, will give an idea of the course of the fibres of this complex muscle.

Fig. 32.



Anterior view of the musculature of the pharynx and palate after removal of tongue, hyoid bone, and larynx, as far as the posterior segment of its thyroid cartilage. From Luschka (Virchow's *Archiv*, March 18, 1868).

A Aponeurosis of the soft palate.
B The thyroidal portion of the palato-pharyngeus.
C The archlike connection of the levator palati.
D Azygos uvulæ muscle.
F. G. Bundle of constrictors in posterior wall of pharynx.
H Pharyngeal portion, and
K Palatal portion of palato-pharyngeus.
L Glosso-pharyngeus.
M Hyo-pharyngeus.
N Posterior segment of thyroid cartilage.
I Aponeurosis of thyreo-pharyngo-palatine muscle, below which are the longitudinal fibres of the œsophagus springing from it.

TUMORS OF THE PALATE.

Tumors are sometimes formed in the soft palate. They may be glandular, cystic, fibroid, or cancerous, or syphilitic. Inspection and palpation determine their diagnosis. They are usually removed by making an incision into the mucous membrane over the tumor, and then peeling the growth out with the fingers without the use of the knife. An operation of this kind is required, as the tumors may enlarge more or less rapidly, and give rise to very serious symptoms, necessitating a very severe operation on account of the extent of tissue involved. Cystic tumors, with fluid contents, are emptied by puncture or incision, and then injected.

The following translation, from an article recently published[1] on adenomas of palate, is presented on account of its interest, and the want of other material to illustrate this subject:—

"In 1847, Nélaton, operating upon a patient for Récamier, discovered the glandular nature of a tumor of the soft palate.

"In 1857, M. L. Rouyer presented to the Parisian Society of Surgery a résumé of all the facts then known concerning these glandular tumors of the palate.

"Two recent observations by Dr. Letenneur, of Nantes, give a complete picture of the progress and symptoms of these tumors, and demonstrate the facility with which they can be enucleated.

"A woman of robust constitution passed through an attack of typhoid fever in 1855. During convalescence her voice was noticed to acquire a nasal twang, but as there was no pain or suffering connected with it, medical advice was not called upon. It was not until Jan., 1860, that the alteration in the timbre of the voice increased greatly, when it soon became veiled in a very remarkable manner. At this period a physician, in conversing with the woman, was struck with this phenomenon, examined her mouth, and recognized the existence of a large tumor. The voice gradually became more and more veiled and nasal, deglutition began to become difficult, especially for liquids, and soon even solids could not be swallowed without a certain amount of annoyance. On May 2 the patient consulted Dr. Letenneur, and he, having recognized the nature of her affection, placed her in the hospital. The character of voice resembled that met with in cases of enlarged tonsils. There was no pain attending the difficulty of deglutition, however. On looking into the mouth, a voluminous tumor was found upon the left side, developed from the neighborhood of the anterior pillar of the palate, the mucous membrane of which enveloped the growth in all parts accessible to the view. The tumor projected in front as far as the last molar tooth but one; it pressed the base of the tongue downwards to a marked degree, and pressed the uvula strongly inwards towards the right side, constricting the isthmus of the fauces in a remarkable manner, so that the finger could not be insinuated into the pharynx without some effort. The tumor measured six centimetres from above downwards, and about four and a half centimetres from side to side.

---

[1] *Arch. Gén. de Méd.*, April, May, June, 1871, p. 529. From *Journ. de Méd. de l'Ouest*, 30 Avril, 1870.

"Although it pressed the wall of the mouth strongly outwards, it was not adherent to it, but could be circumscribed on all sides except below, where it was prolonged towards the glosso-staphyline fold. Above, it was bounded by the palate bone, and was prominent in front of it. Below, it did not project in an appreciable manner towards the pharynx, and was not confounded with the tonsil, which could be distinguished by the finger. Its exterior aspect did not differ sensibly from that presented by the rest of the buccal mucous membrane, except that some small blue veins, moderately developed, coursed on its surface. The mucous membrane was not adherent to the tumor. To the touch it appeared but little hard, without nodulations, offering to pressure a doubtful elasticity. Carrying the finger along its surface, some fine granulations were distinguished, which may be compared to the sensation given by a sac of thin skin filled with millet-seed softened by boiling.

"An operation was performed May 10. Assistants depressed the tongue, and kept the mouth widely open by means of blunt hooks. An incision of four centimetres was made along the great axis of the tumor, the lips of the wound separated of themselves, and disclosed a whitish woof, which formed the envelope of the morbid tissue. After having cut away some slightly resisting adhesions, the two index fingers were introduced between the mucous membrane and the tumor, which was enucleated without any difficulty. The tumor broke into fragments under the digital pressure, but was completely removed. The débris of condensed connective tissue, forming portion of the envelope or cyst in which the tumor was contained, were torn away with the fingers, with the exception of a very small portion which descended towards the base of the tongue, and which would have required too powerful an effort.

"The loss of blood was insignificant, and the walls of the extensive pouch came together naturally. The tumor weighed seventy-five grammes.

"The evening of the operation there was a little cephalalgia, and some pain in deglutition; but on the following day everything was in good order. Cicatrization took place rapidly, and twelve days after the operation the patient left the hospital completely cured.

"*Examination of the Tumor.*—The fragments were of the color of pale rose mingled with a yellow tinge. On crushing or tearing them, fine granulations were felt, and numerous tracts were seen formed by the vessels and by a woof of connective tissue. Scraping produced no juice. A microscopic examination exhibited the glandular nature of the tumor. The acini were concealed by a very abundant embryonic conjunctive tissue forming the stroma. Some of the acini were filled with their nuclear epithelium, and in each preparation it was easy to find free epithelial cellules. There was no evidence of crystals."

The second case occurred in the person of a widow, æt. 38. "The tumor began at 14 years of age, following the spontaneous opening of a gingival abscess which ensued upon extraction of a sound tooth instead of the diseased one next to it. Some time after, she discovered near the region occupied by the abscess, at the right side of the palate, a tumor the size of the end of the finger, which gave her no pain on pressure. In Feb., 1870, a physician in attendance for a slight indisposition remarked the palatine tumor while examining the tongue. . . . . . . The whole right side of the palatine vault was covered by a rounded tumor, which seemed in front to be confounded with the gums, and which behind passed the limit of the osseous vault. The median raphe was not displaced, and the veil of the palate was perfectly free. The tumor was uniform, and some dilated veins coursed on the surface of its mucous membrane, which was somewhat tense. With the finger a granular mass was felt, non-fluctuating, non-elastic, though very firm.

"The operation consisted in a double incision, comprising an elliptical flap, and after the mucous membrane had been dissected to the right and to the left, the entire morbid mass was extracted by the finger, the enucleation being complete; but the tumor broke into several portions. There was considerable hemorrhage, which was arrested by tamponing with dry charpie, and by the use of lotions of cold water. When the hemorrhage was arrested the finger was placed in the cavity, and it was found that the surrounding parts had been completely isolated from the growth by the condensed connective tissue forming the walls of the cavity. A slight hemorrhage occurred some hours afterwards, but was readily arrested without recourse to the tampon. There was fever for ten days following. There was a little swelling of the edges of the wound for about a week, but cicatrization took place satisfactorily without any untoward incident.

"The tumor exhibited the same characteristics as the other one."

Prof. B. Langenbeck[1] has reported a case of large enchondromatous tumor on the under surface of the hard palate, which was detached from the mucous membrane and bone of that structure. Union ensued by first intention.

Adhesions of the palate to the pharynx, or to the tongue, sometimes occur as the result of inflammation, most frequently in connection with syphilis. To remedy this condition, the parts must be separated with the knife, and the edges cauterized to prevent readhesion. Bits of lint may be interposed to assist this purpose, the tents being attached to a string confined by adhesive strips outside of the mouth, or tied around the ear; without which precaution they might, when detached, fall into the larynx or upon it, and produce serious consequences.

---

[1] (*Deutsche Klinik*) *Canst. Jahrb.*, Vol. IV., 1860, p. 323.

An instructive case of extensive adhesion of the inferior margin of the soft palate to the posterior wall of the fauces, with a description of the parts seen on dissection,[1] has been narrated by Dr. Wm. Turner, who refers to two similar cases, one related by Rudtorffer,[2] and the other by Otto[3].

CLEFT PALATE.

This affection is usually congenital, but may be acquired as the result of disease or accident. It is remedied by means of a surgical operation, or by the employment of an obturator supplied by a skilful dentist.

In operating upon a case where the cleft concerns the soft palate alone, the edges are pared, silk or wire sutures are inserted into the flaps, and the parts brought together. Undue tension is relieved by division of the levator palati muscles on either side, and, if need be, by division of the posterior palatine arch. The latter operation is best performed below the tonsil; and the former by the method of Pollock, which is to insert a double-edged knife through the anterior mucous membrane just within the hamular process, and then to divide the muscle, or rather saw it through, by raising and lowering the handle, producing in this way an entire division of the muscle without a large wound anteriorly.

Cleft of the hard and soft palate may often be permanently closed at one operation. Sometimes the parts give way in more or less of their extent, necessitating a second operation for the closure of the gap.

---

[1] *Edinb. Med. Jour.*, Jany., 1860, p. 612, illustrated.

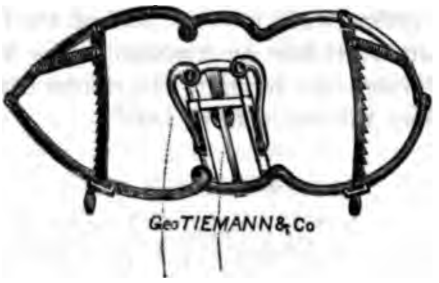
[2] *Abhandlung über die einfachste und sicherste Operationsmethode eingesperrten Leistern, und Schenkelbrüche*, vol. i. p. 192. Wien, 1805.

[3] *Handbuch der Pathol. Anat.*, p. 210, note. Breslau, 1813.

The best operation is that of Langenbeck, which, with a slight modification, the author has completed expeditiously in a single operation as follows:—

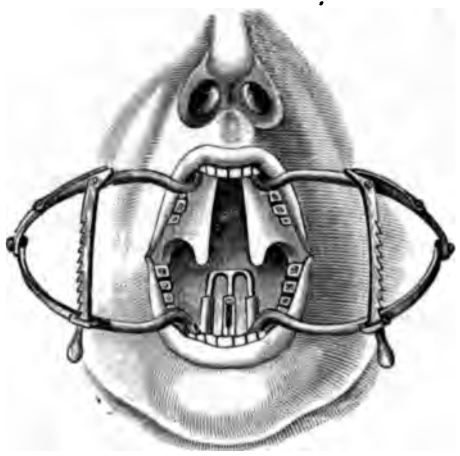
The mouth being distended by Elsberg's modification of the gag devised by Smith (figs. 33 and 34), the edges of the entire cleft were split instead of being pared. This was done in a case of enormous cleft, to avoid any loss of tissue. An incision was then made, according to the indications laid down by Langenbeck, on

Fig. 33.



Mouth distender, for facilitating the operation for cleft palate, and other operations within the mouth.

Fig. 34.



Mouth distender in position for the operation of cleft palate.

each side of the alveolar ridge extending from a line on a level with the second incisor tooth, as far back as the last molar, the incision penetrating into the bone. A blunt, flat blade of steel, bent at its extremity to an angle of about forty-five degrees, was insinuated beneath the periosteum, and gently urged forward with a sawing motion until it appeared in the slit at the cleft, the instrument being kept all the time in close contact with bone, so as to raise periosteum and mucous membrane together. This motion was then continued upwards and downwards until the entire flap was raised free from the bone. The elevator muscles of the palate were then divided by the method of Pollock, the incision for this purpose being on a line with, and close to, the posterior portion of the incision through the hard structures. The parts, in the instance referred to, came together without any necessity for section of the posterior palatine arch, which was therefore not divided. Wire sutures were passed through the edges of the flap by Langenbeck's needle, except as the uvula was approached, when a needle in the form of a semicircle, and held in Schwerdt's forceps, was found to suit better for these very movable parts. Five or six sutures were placed in the hard and soft palate, and two in the uvula. The former were secured by a shot on each side of the cleft, the latter by a single shot. The central suture cut its way out in four or five days; the others all held, and in eight days the entire wound united, except a small oval opening, comprising the place which had been secured by the suture which cut out. This opening gradually contracted to the size of a small pin-head.

The subject of cleft palate, though belonging to the surgery of the mouth rather than that of the throat, is mentioned here, merely to draw attention to the success attained in splitting the edges of the flap instead of paring them, the operation being believed to be unique in that particular. A detailed account of the operation, and the circumstances leading to it, will be published elsewhere. The case is depicted in connection with the subject of glandular hypertrophy of the vault of the pharynx.

For the best account of operations of this kind that I have seen in English, the reader is referred to the admirable essay of

Dr. Wm. R. Whitehead,[1] of New York, a gentleman well skilled, perhaps no one more so, in delicate manipulations of this kind.

PARALYSIS OF THE PALATE.

Paralysis of the palate occurs not infrequently as a sequel of diphtheria, and is alluded to in the description of that affection.

A paralysis of the palate, resembling the diphtheritic paralysis, occasionally occurs independently of any connection of this kind, but usually following some affection of the throat. Cases of this kind, following cold, or sore throat, have been recorded[2] by Drs. Broadbent, Weber, Silver, Anstie, and Gull.

A case of this kind came under my own care some eighteen months ago, in which the paralysis appeared subsequent to the termination of a successful treatment of a chronic nasal catarrh. The mucous membrane of the turbinated bones had been very much thickened, and was freely removed with forceps; this, and the local use of salt water, constituting the essential treatment. Some months afterwards, the patient, an intelligent gentleman, some thirty-five years of age, came to me to see what could be done to remedy a difficulty of swallowing that had been gradually coming on. There was an impossibility to swallow liquids; nearly every drop of liquid swallowed returned by the nose, and none of it passed into the œsophagus. The patient could not swallow soup; could not quench his thirst. There was no trouble in swallowing solids. Examination revealed a paralysis of the elevator muscles of the palate. Treatment by electricity was adopted, the negative electrode from an induction apparatus being promenaded over the muscular structure of the palate anteriorly and posteriorly, the positive electrode being placed at some indifferent portion of the body. A rather protracted treatment gradually restored the lost powers of deglutition, but the patient's public duties required his presence at home from time to time, which rendered the treatment longer in duration than if it could have been employed continuously.

---

[1] Account of a new and very successful Operation for the worst forms of Cleft of the Hard Palate; with a brief analysis of 55 cases; illustrated. *Am. Jour. Med. Sci.*, Oct. 1868, p. 383.

[2] *Med. Times and Gaz.*, March 4, 1871, p. 262-3.

SPECIAL AFFECTIONS OF THE UVULA.

Chronic Elongation of the Uvula.—The uvula is liable to elongation with and without hypertrophy. Sometimes the mucous membrane alone is elongated, but occasionally the muscular tissue also. When hypertrophied, the excess of size is mostly due to interstitial deposit beneath the mucous membrane. When the mucous membrane alone is involved, the elongation has the form of a thin strip of tissue tapering to a point. The contact of the uvula with the tongue produces a tickling sensation, with a disposition to hem so as to get rid of it. Sometimes the uvula dips down behind the epiglottis, exciting frequent cough, and not unfrequently hoarseness, from the congestion produced in the larynx. Sometimes suffocating paroxysms are induced in this way. These symptoms are most frequent on lying down, which favors the mechanical condition giving rise to them. Occasionally the elongation is so great that half an inch of the organ rests upon the tongue; and one or two cases have been recorded in which the enlarged uvula could be brought between the incisor teeth.

The indication for the relief of this condition consists in the removal of the exuberant portion; an operation readily performed by seizing the tip of the organ with a pair of delicate forceps, drawing it forwards into the mouth, and then dividing it above the forceps by the knife or a pair of curved or straight scissors. A pair of straight scissors, with a guard on one of the blades, to prevent the organ from slipping, insures a level excision. If carelessly performed, the stump will be longer on one side than another. An uvulatome, similar in construction to Physic's tonsillotome, but with scissor-blades, and with a pair of forceps attached below, to seize the uvula as it is divided, renders the operation very easy of performance.

In some instances, where the uvula is very broad, a piece is removed shaped like an inverted V, and the flaps are brought together by silken or wire suture.

The bleeding after excision of the uvula is usually insignificant, but occasionally it is quite profuse. Under these circumstances it may be controlled, as in a case recorded by Lisfranc, by compressing the stump between the blades of a pair of forceps.

The parts heal readily in a few days. Sometimes a membranous exudation appears on the divided surface, but this is rarely of any moment. Swallowing is sometimes difficult for a few days, and may necessitate the employment of liquid or semisolid food. No after-treatment is required as a rule, but it is as well as not to encourage the use of a mild gargle, such as one of borax, alum, or chlorate of potassa.

Where the elongation is moderate and of recent date, retraction can sometimes be produced by mechanical irritation, cauterization with nitrate of silver, or the use of an astringent lozenge or powder. A piece of catechu, frequently placed on the base of the tongue and allowed to dissolve there, will sometimes accomplish the purpose. Capsicum applied to the uvula sometimes answers extremely well.

Œdema of the Uvula.—Œdema of the uvula sometimes occurs during the progress of acute or chronic sore throat, and the organ may acquire the size of a large bean or even that of a plum, and will produce spasms of asphyxia. The same condition may occur from the incautious use of caustics. An accident of this kind occurred under my own hands some years ago. I had cauterized the soft palate of a syphilitic patient, in the morning, with a moderately strong solution of the acid nitrate of mercury. I was routed up at night with the information that my patient was much worse, and apparently choking to death. On arriving at the bedside and looking into the mouth, the uvula was seen to be swollen by œdema to the size of the terminal phalanx of a man's thumb. Passing the tongue-depressor beneath it, it was raised up, and all suffocative symptoms vanished. Cutting off the end with a pair of ordinary scissors, vent was given to the effused serum, and the unpleasant complication was overcome.

The treatment of the œdematous uvula consists in giving vent to the fluid by incision, or excision of its end. Sometimes the œdema is attended by hemorrhage beneath the mucous tissue, under which circumstance the color of the swollen organ will be a blackish blue, instead of the whitish pink of ordinary œdema. Sometimes a constriction divides this portion from the upper part of the uvula. A puncture and the use of astringent washes will usually suffice for the treatment.

Excrescences on the Uvula.—Excrescences on the uvula are occasionally seen in cases of syphilis. I have seen them also in cases of phthisis. If they are of large size they may give rise to the unpleasant symptoms mentioned under the head of elongation of the uvula. They are readily snipped off with the scissors, after which the cut surface may be cauterized by the nitrate of silver.

Bifid Uvula.—A bifid uvula is occasionally met with as a congenital condition. Sometimes inflammation affecting the uvula will be confined to one-half of the organ, and thus gives rise to the appearance of bifid uvula with one limb longer than the other.

CHAPTER X.

SPECIAL AFFECTIONS OF THE PHARYNX.

THE subject of pharyngitis has been mentioned in connection with the subject of sore throat. It rarely exists as an independent affection, except under the conditions to be described in the section following.

ABSCESS OF THE PHARYNX.

Under certain circumstances of inflammation of the pharynx, an abscess is formed beneath the mucous membrane, which, if not recognized and properly treated, is almost certain to prove fatal within a comparatively short period; usually from pressure upon the upper air-passages, preventing respiration, but occasionally from starvation also, on account of the inability to swallow.[1] These abscesses sometimes open spontaneously, but rarely, inasmuch as death is likely to take place from asphyxia before the matter has had time to make its way through to the surface.

These abscesses, most generally known under the name of retro-pharyngeal abscesses, occur at all ages, but a large majority of the cases reported have been encountered in young children before the age of puberty, frequently during the first few months or weeks of life; and they have been observed in the new-born babe.[2]

The anatomical arrangement of the parts involved, specially favors the formation of abscesses in this region. The posterior wall of the pharynx is attached to the soft parts covering the bodies of the vertebræ by very lax and ductile connective tissue, which permits a great deal of mobility to the pharynx. Ample room is thus afforded for the accumulation of purulent matter, which usually pushes the posterior wall of the pharynx forward over the orifice of the larynx; though occasionally the fluids gravitate towards the posterior mediastinum, and are then liable to perforate the œsophagus, the trachea, or the pleural sac.

---

[1] Carmichael; *Medico-Chirurgical Review*, Vol. ii. 1821, p. 518.

[2] Stromeyer's *Handbuch der Chirurgie.*

The exciting cause of this affection, when not traumatic, is usually exposure to cold, or a sudden change from extreme cold to undue warmth.

Most of the cases occur in individuals laboring under the syphilitic or the strumous diathesis; and these cases are usually preceded by caries of the cervical vertebræ, or by inflammation of the lymphatic glands which exist behind the posterior wall of the pharynx. Sometimes, however, they follow an insidious form of inflammation occupying the connective tissue between the pharynx and the vertebræ. In some few instances the disease seems to be idiopathic.[1] At least no assignable cause, local or constitutional, can be detected by which to account for the appearance of the affection. It sometimes follows acute inflammation of the tonsils; sometimes acute inflammation of the pharynx without involvement of the tonsils. Occasionally it seems to be a metastasis of erysipelas,[2] several cases of this kind being on record. As traumatic causes, we have recorded a blow of a fencing-foil, which entered through the nostril;[3] numerous cases of foreign bodies, principally pieces of bone accidentally swallowed,[4] eight cases of which have been collected by Dr. Allin;[5] the swallowing of pins,[6] etc.

The greatest number of cases of retro-pharyngeal abscess occur in connection with caries of the cervical vertebræ, and there often coexist symptoms of scrofulous degeneration or syphilitic contamination elsewhere. In some instances the caries of the vertebræ is preceded by inflammation of the pharynx. The articular surfaces of the vertebræ are liable to be the seat of the disease, and in this way dislocation of the vertebræ occurs, producing pressure upon the cord. Nearly all cases of abscess of the pharynx in connection with caries of the vertebræ prove fatal, even when the abscess has been properly treated, and the case has been judiciously managed afterwards. This is particularly the case when the abscess is at all large. Prof. Stromeyer, in his Manual of Surgery, distinctly states that he has seen all of his cases die in whom caries of the vertebræ had given rise to a large retro-pharyngeal abscess. Cases are not wanting, however, in which a recovery has been effected, though in most instances attended with a permanent deformity from the altered position of the cervical portion of the spinal column.[1] In Dr. Allin's table but three cases, including that of Dr. Flemming, with caries of the vertebræ are recorded as having recovered, and in these the terms "probable" and "supposed" are prefixed, so that there is an uncertainty in this respect.

---

[1] Gautier; *Des abscès retro-pharyngiens idiopathiques, ou de l'angine phlegmoneuse.* Genève et Bâle. 1869.

[2] Priou; *Am. Jour. Med. Sci.*, Nov. 1830, p. 251. From *Revue Médicale*, April, 1830. Christopher Flemming; *Dub. Med. Jour.*, vol. xvii. 1840, p. 58. *Froriep's Not.* xiv. 1840, p. 157. Mondière; *Annales d'Obstetrique*, Dec. 1842. (?)

[3] Chas. M. Allin; *N. Y. Jour. Med.*, Nov., 1851, p. 329, from Morel, *Paris. Chir. Journ.*, ii., 1794, p. 318.

[4] Cooper's *Lectures*, Phila. ed., 1839, p. 68.

[5] Retro-pharyngeal Abscess. *N. Y. Jour. Med.*, Nov. 1851, p. 307 *et seq.* (58 cases.)

[6] Pollock; in Holmes' *System of Surgery*, Vol. iv., p. 484.

Dr. Syme[2] has, however, narrated a case, occurring in an adult, in which a large portion of the second cervical vertebra exfoliated and was discharged into the pharynx, whence it was finally removed by the patient, who subsequently recovered.

Günther[3] narrates a case of Uhde's (Deutsche Klinik, 1856, p. 34), in which the bodies of the third and fourth cervical vertebræ were removed, and the patient recovered. But as this occurred in a case of syphilis in an individual forty years of age, it is probable that the usual course of acute abscess was somewhat modified.

These cases are altogether exceptional.

In retro-pharyngeal abscess from other causes, the prognosis is favorable if the disease is early recognized and properly treated. If undetected, and therefore not attended to, death from asphyxia will in all probability result before the abscess has matured sufficiently to rupture spontaneously. Many an instance is on record, even at comparatively recent dates, in which the disease was not recognized until an examination *post mortem*; and others are recorded in which the existence of the disease was likewise unsuspected, and the patient's life saved only by the fortunate rupture of the abscess, explaining the nature of the difficulty. Dr. Allin records in his tables a case which occurred in the New York Hospital, August, 1849, in which the patient was being treated for syphilitic ulceration of the throat, and the abscess was accidentally ruptured during the introduction of a probang, employed for the purpose of applying a solution of nitrate of silver to the parts, the true nature of the disease having been neither recognized nor suspected. This fortuitous accident probably saved the life of that patient.

---

[1] Christopher Flemming, *Dublin Quar. Jour. Med. Sci.*, Feb., 1850, p. 224.

[2] *Edinburgh Med. and Surg. Journ.*, Apl., 1826, p. 311, with illustration.

[3] *Lehre von den Blutigen Operationen*, vol. v., p. 7.

Those cases due to the presence of a foreign body, it is perhaps impossible to cure by removal of the offending substance, inasmuch as it must be completely hidden by the swelling. The abscess must be treated, therefore, in just the same manner as abscesses from other causes. Sometimes the foreign body remains embedded in the soft parts covering the vertebræ to which it has penetrated. Sometimes it is loose in the fluids of the abscess. These points have been verified by *post-mortem* examinations. In some instances the foreign body has been discharged with the contents of the abscess. More frequently the foreign body, usually a piece of bone, passes onward into the stomach after having produced the injury. In one of the cases collected by Dr. Allin[1] the bone passed through the alimentary tract and escaped per anum; though not extracted thence without a good deal of pain.

Two cases are recorded by Mr. John Adams,[2] in one of which the impaction of a fish-bone into the vertebral column resulted in caries, followed by abscess.

---

[1] M. Fillean, quoted by Gibert. *London Lancet*, June, 1828, p. 393, from *Arch. Gén. de Méd.*, May, 1828.

[2] *London Lancet*, June, 1847, p. 581.

Retro-pharyngeal abscess has occasionally perforated the internal carotid artery, by extension behind the tonsil, producing death by hemorrhage; cases of which have been reported by Hölzle,[1] Leishman,[2] and others.

In view, therefore, of the importance of this malady as regards the direct responsibility of the medical attendant in reference to a fatal issue, it is incumbent on the practitioner to bear its likelihood in mind in all cases of disease of the throat impeding respiration or obstructing deglutition, in order that a due ocular inspection and digital exploration of the parts should be instituted; simple measures which promptly decide the diagnosis. In some instances the patient cannot open the mouth wide enough to permit an inspection of the parts, and then we have to depend upon the touch alone. In most instances, however, the mouth can be opened far enough to permit a good view of the pharynx by depressing the tongue with a tongue-depressor, the handle of a spoon, or a lead-pencil. On looking into the pharynx, we observe that its posterior wall projects into the cavity of the organ in some portion of its extent, forming a tumid swelling which encroaches on the calibre of the tube. When this is high up, the soft palate lies upon it; but sometimes the entire abscess is at a lower level. There are usually other evidences, than the mere swelling, of inflammation of the mucous membrane of the pharynx and adjacent parts, over which congested blood-vessels are seen to course, and on which, occasionally, spots of ecchymosis are irregularly distributed; but in a great many cases there is no evidence whatever of inflammation beyond that of the swelling itself.

Palpation with the finger reveals the fluctuating character of the swelling, and stamps the diagnosis of abscess; for a similar appearance of the parts may exist in cases of tumor of the pharynx, and mere inspection, therefore, may be deceptive.

The general symptoms of the affection which point to the probable existence of an abscess are: pain and soreness in the parts, referred to the palate when the abscess reaches high up, but often extending over the entire throat; difficulty of swallowing, amounting in some instances to complete dysphagia; some impediment to respiration, the dyspnœa often increasing to such an extent as to compel the maintenance of the semi-erect posture. The voice is sonorous, but produced with difficulty, and is muffled or nasal in tone. External pressure and movement of the stiff neck will produce pain, or reveal tenderness. There is usually some distinct history of an attack of chilliness or shivering, denotive of the formation of pus. All the usual phenomena of obstructed respiration occur, and there are the ordinary symptoms of suppurative inflammation, such as acceleration of the pulse, heat of skin, and actual increase of temperature. Associated with these symptoms, there are in many cases external manifestations of tumefaction about the throat, sometimes at one point, sometimes at two or three, increasing in volume as the disease progresses. The principal point of swelling is behind the external angle of the jaw, in the depression in front of the border of the sterno-cleido-mastoid muscle; and upon this point Mondière lays great stress, having observed it in all his cases of chronic retro-pharyngeal abscess. Sometimes the larynx is pushed forward so as to be rendered unusually prominent. In cases in which the matter gravitates, the swelling will extend lower down, and in one fatal case[1] has been described as simulating disease of the thyroid gland.

---

[1] *Schmidt's Jahrb.*, 98, xcviii., p. 312.

[2] *Glasgow Med. Journ.*, N. S., May, 1869, p. 405.

Sometimes the abscess is formed between the membranous wall of the pharynx and the sheaths of the muscles, in which instances there will be but little interference with deglutition, and the cases may have time for full progression so as to rupture spontaneously.

In one form of this disease the abscess forms behind both pharynx and œsophagus. Mondiere[2] has reported eleven such instances in adults, and seven in children varying in age from a few weeks to four years. Most of these cases arose from caries of the vertebræ, but the cause of the affection was not always apparent. Three cases followed inflammation of the throat; one case appeared to have been a metastasis of erysipelas; two cases were of rheumatic origin; and one, in a case of stricture of the œsophagus, originated apparently from overstraining in attempts to swallow large morsels of food.

---

[1] J. Henry Clark, *N. Y. Jour. Med.*, July, 1849, p. 34.

[2] Günther: op. cit., p. 6.

It has been mentioned that the contents of the pharyngeal abscess sometimes gravitates behind the œsophagus, but there are also cases in which the abscess commences in this region, forming a variety which has been named retro-œsophageal abscess. Like the ordinary form, this variety is also due principally to inflammation and caries of the vertebræ. Günther describes, after Duparcque,[1] a number of symptoms which serve to distinguish this variety, the principal of which are the following:—

The swelling in the lateral region of the neck is lower down, occupies a position further forward, and especially upon the left side. The food swallowed, instead of remaining in the mouth, or being driven through the nostrils, is carried downwards, some of it being swallowed, but some of it passing into the larynx and producing severe paroxysms of cough. The walls of the entire larynx being pressed together, the voice is shrill, piping, and comparable to that of a duck:

The relief to respiration by the sitting posture is not as marked. Pressure upon the œsophagus produces more pain than pressure upon the larynx or the upper portion of the trachea. Pressure upon the larynx prevents respiration entirely, and produces paroxysms of asphyxia. The abscess is not felt through the mouth.

These cases terminate fatally. Sometimes they rupture into the œsophagus. Several cases are mentioned by Günther, from the records of Duparcque, Noll, and Uhde.

Treatment.—The proper treatment for these abscesses consists in timely opening them by the knife to give free egress to the pus. For this purpose the best method is to place one forefinger upon the abscess, and then to pass along it a sharp bistoury, protected to within half an inch of its point, and to make a free opening longitudinally. Sometimes it may be better to make a transverse incision. Sir Astley Cooper, Priou, Flemming, and others employed an ordinary or specially arranged trocar and canula. In one instance puncture with an exploring-needle answered the purpose. Dr. Allin objects to the use of the trocar, on account of the danger of piercing the vertebræ, and thus giving trouble afterwards. Where the abscess extends behind the tonsil, special care is requisite on account of the proximity of the carotid artery. The abscess has also been opened by the finger-nail, and in some instances mere pressure with the finger[1] has sufficed to rupture the walls of the abscess.

---

[1] *Schmidt's Jahrb.*, v. Supplement, p. 191.

The contents of the abscess are usually discharged by the mouth, but this is not invariably the case. Günther[2] mentions an observation of Petrunti, in which the pus descended along the lateral walls of the throat, pushing the larynx forward, and producing such difficulty in breathing that an external incision became necessary in order to save the life of the patient. In this case the pus was found between the pharynx and larynx.

In some instances there is such relaxation of the connective tissue between the parts involved in the disease, that, after evacuation of the abscess, pus accumulates behind the pharynx, below the line of the wound made by the incision. In these cases Günther recommends slitting the sac longitudinally and injecting solutions of an irritating character.

In cases of retro-œsophageal abscess, the necessity for performing tracheotomy sometimes becomes imperative.

Where retro-pharyngeal abscess has been the result of acute inflammation, the parts usually heal rapidly after discharge of their contents, much in the manner of subsidence in abscess of the tonsil after incision. Occasionally, however, a large ulcer will remain and impede deglutition until granulation is well established.

A few remarks, in conclusion of this subject, are requisite in relation to the differential diagnosis. As the affection occurs most frequently in children, it is apt, from the similarity of some of the symptoms, to be confounded with croup. In the adult it may be mistaken for œdema of the larynx.

---

[1] Christopher Flemming: *Dub. Quart. Jour. Med. Sci.*, Feb., 1850, p. 224. *Froriep's Not.* xiv., p. 153.

[2] Op. cit., p. 6.

The existence of an abscess of this kind may be suspected in a child when attacked by frequent suffocative paroxysms, similar in many respects to those encountered in croup, but not exhibiting the same distinctness of remission. The restlessness of the patient and the actual obstruction to respiration is said to be greater than that witnessed in croup; and the relief to respiration afforded by the sitting posture may be taken as another indication of the nature of the disease. The voice is not affected as it is sometimes in croup, there being no impediment to the free vibration of the vocal cords. Pressure upon the parts always produces pain, which is not the case in croup. If there be any external swelling in croup, it will be below the angle of the jaw; while it is farther forward in retro-pharyngeal abscess, and more deeply situated beneath the sterno-cleido-mastoid muscle.

Œdema of the larynx is more sudden in its onset, and the obstruction to breathing occurs principally in inspiration, from the valve-like action of the fluctuating folds of œdematous tissue, as more fully described in the article on that affection. Digital exploration and ocular inspection, direct or in the laryngoscopic mirror, will set all doubts at rest.

The after-treatment of this disease will depend upon the peculiarities of the case, and the nature of the constitutional dyscrasia; and it is to be conducted on the general principles of therapeutics.

CHRONIC FOLLICULAR PHARYNGITIS.

The exact manner in which chronic follicular pharyngitis commences is not well known, for it is only when a patient has been suffering more or less for a considerable time, that he becomes conscious of the existence of a permanent disease of the throat, leading him to solicit the assistance of a medical practitioner; and very often the annoyance endured, though constant, is so slight in character, and so little liable to aggravation, that he is still longer deterred from seeking professional aid. In this manner it happens that the physician is rarely afforded an opportunity of seeing the disease until after it has already existed for several months or several years. The story of the patient, with some variations and modifications, will in most cases run thus: —that some months or some years back, there gradually forced itself upon the consciousness, a sense of the existence of permanent trouble in the throat. This may have been mere dryness, with or without a disposition to cough or to expectorate; but some disposition or other to clear the throat from a foreign body is almost always spoken of as an early manifestation. With this there may be connected, and certainly will be sooner or later, if the disease continues, some degree of hoarseness, inequality, or impairment of the voice, the patient being unable to depend upon it for public purposes. In some cases more or less trouble is experienced in swallowing. In some there is more or less impairment of hearing. Pain is not often complained of very early in the disorder, and the discomfort is usually more that of an annoying sensation, referred to a feeling as of the presence of some foreign body, as a hair, a bristle, a pin, a lump, and so on. Sometimes there will be headache, distinctly referable to exacerbation of the throat trouble. Usually there will be more or less symptoms of dyspepsia and indigestion. Very often coolness of the extremities will be complained of. With all these symptoms, the patient will feel in tolerable good health, and be still able, with more or less effort, to attend to his ordinary avocations.

When the history of the disease is recounted at a later date, we will be informed of the above enumerated symptoms, and be then told that they gradually increased in severity, sometimes with constant progression, sometimes as a result of exposure to changes of temperature, which would be followed by an aggravation of symptoms, subsiding to some extent in a few days or weeks, and the result remaining stationary until the occurrence of a fresh accession. The trouble with the voice will have gradually increased, and in the case of clergymen and other public speakers, have perhaps proceeded so far as to disable them from performance of their pastoral or secular duties. The cough will have become more frequent, accompanied by the expectoration of viscid mucus, and attended with a scratching or still more unpleasant or even painful sensation in the throat, usually referred to the pharynx at the region of the base of the tongue, or to the larynx. Respiration is affected at times, but that difficulty is of nervous origin altogether. Dysphagia, too, is occasionally complained of, and is also usually nervous in character.

As a rule, the patient will have tried a great variety of local and systemic remedies, which have failed in affording relief; and much of the intestinal disturbance that is complained of may be due to the effect of the medicines that have been employed.

The causes of this affection are not thoroughly understood. It makes its appearance in individuals of all classes, without distinction of temperament, social position, or employment. It probably never occurs as a direct result of acute inflammation of the pharynx, though it is easy to understand how repeated attacks of sore throat of an acute or subacute character would gradually bring about the condition under consideration. Under such circumstances the causes would be those already enumerated under the head of sore throat; and the less effective but persistent exposure to the same class of causes could very well gradually induce a condition of chronic inflammation, without there having been any previous acute or subacute inflammation. It is highly probable that in the majority of instances the cases are of a chronic character from beginning to end.

Although this affection, from its prominence among the clergy, has received the appellation "clergyman's sore throat," it is by no means confined to members of that profession, nor even to public speakers. Professor Green, our great authority on this disease, writes: "Of nearly four hundred cases that have fallen under my observation, only about seventy-eight, or one in five, of this number, were, in any way, public speakers." But it is evident, as he adds, that "when the affection does occur in those persons who are in the habit of exercising the vocal organs by public speaking, singing, teaching, etc., it is always, for obvious reasons, attended with symptoms of a more aggravated nature than when it appears under ordinary circumstances."

Dr. Gibb, in his work on diseases of the throat, states that he has seen this disease in a very exaggerated form in photographers, and in persons much exposed to the fumes of acrid chemicals in confined chambers, and that its obstinacy in them is quite remarkable. We should imagine the obstinacy of the affection to be due to the persistence with which such individuals are constantly exposed and re-exposed to the exciting cause. If their occupations could be changed, the disease would probably be found more manageable.

The reason of its prevalence among clergymen is, at least in part, due to the inequalities of temperature under which they are often compelled to preach; with head, often sparsely covered with hair, exposed to draughts from open windows, or the open air, at the moment that they are using the organs of the throat in addressing their auditors, and thus exposing these parts also to the influence of cold air which has not been warmed by previous passage through the nostrils. Preaching in a cold church is sometimes an exciting cause.

I have known more than one academic lecturer who contracted a chronic pharyngitis every autumn from the access of currents of air from open windows striking upon a bald head, and in which the use of a skull-cap during exposure secured immunity from the attack.

It has been stated by some authors that the Catholic clergy are less liable to this form of disease than clergymen of other persuasions, and that the greater liability of the latter class is in great part attributable to their more frequent habit of leaning over the pulpit to read their discourses, thus compressing the muscles of the thorax and abdomen at a time when their unimpeded action is desirable; and that the immunity in the other class is due to their preaching extemporaneously, and thus maintaining the erect posture. That there is some force in this remark we may be very willing to admit, but, as far as my own experience is concerned, there has been no evidence of immunity in this respect for the Catholic clergy.

Very often the only apparent cause is a depressed state of mind, from domestic and pecuniary troubles, or the effect of prolonged sedentary and harassing professional occupations.

The appearances of the parts in this disease are very characteristic, though they are exceedingly various.

Perhaps the most frequent appearance presented is that of numerous small projections, sometimes circular in outline, sometimes irregular, varying in size from that of a pin-head to that of a small pea, though not very often acquiring the latter dimensions, especially in cases of comparatively short duration. Their color is a deeper red than that of the surrounding mucous tissue, which is also deeper in tint than is normal. These prominences are isolated or in clusters. They are more apt to be in clusters at the lateral angles of the pharynx, though frequently enough so on the posterior wall also. These prominences comprise enlarged or hypertrophied glands, enlarged probably by an arrest of their secretion, which has no longer an outlet on account of the swollen condition of their mouths, which are thus blocked up. Sometimes the watery matters of the secretion being reabsorbed, there remains the albuminous portion, to which additions are constantly made; and very often, finally, the contents have a cheesy character, which has been denominated "tubercular" by Prof. Green, and are also so called by Gibb and many others who have followed him in his description of the complaint, under the name of *follicular disease of the throat and air-passages*,[1] or *follicular disease of the pharyngo-laryngeal membrane.* I cannot, however, subscribe to the opinion that the contents of these glands are tuberculous matter in that form of complaint under consideration; though it does sometimes occur that tuberculous deposits take place in the pharyngeal mucous membrane, and they may even undergo the metamorphosis into carbonate of lime, for I have occasionally seen them there, and in one or two instances removed with the point of the knife small calcareous concretions in every way similar to those concretions occasionally expectorated in cases of pulmonary tuberculosis.

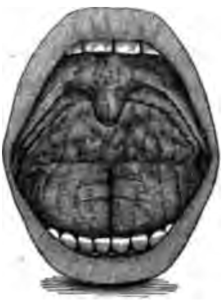
I am the less inclined to approve of the term *tubercular sore throat*, which is employed by the authorities alluded to, as a synonym for this disease, because the affection has been known to have existed for many years without being accompanied or followed by tuberculous phthisis, a result which could hardly be avoided in the prolonged persistence of a disease really tuberculous in character. It is true that tuberculous consumption is preceded in some instances by chronic follicular disease of the mucous covering of the pharynx and larynx; but this condition may have produced a predisposition to tuberculous disease, evidences of which ultimately make their appearance in the follicles or in the mucous membrane as an expression of the general condition of system which has ensued.

---

[1] A Treatise on Diseases of the Air-Passages. New York (4th Edit.), 1858

There is usually a narrow line of redness about the base of these enlargements; and sometimes the patches in which they occur are so close to each other, that the accumulated red lines, by which they are bordered, appear mapped out into irregular spaces for the reception of the enlarged masses. The ordinary transparent exhalation which bathes the mucous membrane in the healthy condition is superseded by mucus, which is often adherent, here and there, in viscid clumps. In some parts of the membrane not yet invaded by the diseased action, the normal exhalation will have become collected into minute drops which appear like groups of vesicles, and have often been mistaken for herpetic eruptions, similar to those which sometimes precede ordinary membranous sore throat. The interspaced mucous membrane in the vicinity of these patches of drops of moisture, appears sunken in by contrast, and the general aspect is that "slightly raw and granulated appearance" so much spoken of in the books. In this form of the disease there is no rawness; the loss of epithelium is merely apparent, and the vesicles can all be wiped off with a soft sponge, showing the membrane beneath to be in a healthy condition. Similar apparent vesicles are often seen upon the root of the uvula and upon the soft palate, which structures are sometimes the seat also of small groups of enlarged glands; and occasionally they occupy the edges of the arches of the palate, giving its border an uneven appearance. The tonsils are not

Fig. 35.



Follicular pharyngitis.

apt to be affected in this stage of the complaint; nor the uvula to be elongated. It is difficult to depict the appearances which have just been described, but an attempt has been made to do so in Fig. 35, in which the enlarged follicles are well seen.

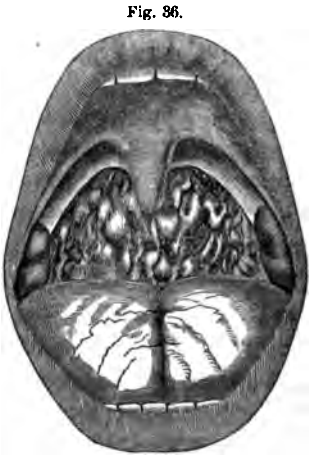
At this stage of the disease there is only a moderate sense of annoyance in the throat, a little expectoration of viscid mucus at times, but no cough. Nor is the voice much affected, except perhaps after long or continued use; and then power is regained by a rest of a day or two. The larynx will show signs of irritation, with congestion of the vocal cords after the use of the voice, but not during the intervals. Thus, supposing the patient a clergyman who preached on the Sunday;—on Saturday his larynx will have appeared normal, on the Monday it will be congested. The active disease is confined to the pharynx.

When the disease has progressed further, we find that the follicles have become still more enlarged. A more viscid mucus adheres to the parts and in greater quantity; and upon the upper portion of the posterior wall, behind the soft palate, we often find irregular patches of concreted mucus which have gradually fallen down, or been hawked down from the enlarged follicles existing at the upper portion of the pharynx, the glandular tissue at the vault of the pharynx having participated in the disease. Sometimes strings of this mucus will hang down from the posterior wall of the soft palate, showing that the nasal aspect of the palate and perhaps the posterior nares are also invaded by the diseased action. The patches of groups of enlarged follicles will have become much larger, and almost always longer than they are broad, but presenting great differences in this respect. Their surface is often velvety, and to the touch they are elastic. The isolated follicles will be apt to have become ulcerated, and small whitish masses of mucus will hang down from them upon the mucous membrane, and become coalesced with similar masses from enlarged follicles below. Sometimes these follicles will present the appearance of inflamed pustules on the point of bursting. In the interspaces irregular spots of superficial ulceration will be seen showing a destruction of the epithelial layer of the mucous membrane. The uvula is apt to have become elongated, and its surface as well as the surface of the velum will be more thickly studded with enlarged glands, though they are not as apt to be ulcerated as are those of the pharynx. At other times groups of real vesicles will be observed on the soft palate and the uvula; often arranged more or less linearly, on each side of the raphe. The tonsils, too, will have become irregularly enlarged, and often exhibit upon their surface superficial ulcerations, covered with a grayish or whitish secretion. A common appearance presented, when the affection is of long standing, is depicted in Fig. 36.

The symptoms of hoarseness, expectoration, and dysphagia will all be increased in severity, and cough will be present in a greater or less degree. The larynx will be found to exhibit the evidences of chronic inflammation of its mucous membrane, to be described in detail under the head of chronic laryngitis. When the tongue is well depressed, the appearances mentioned will be found to exist to some extent in the lower portion of the pharynx.

As the disease progresses the inflamed follicles ulcerate, the surfaces of the ulcers becoming coated with a grayish secretion which trickles down over the surface of the membrane. The angles of the pharynx are quite prone to be the seat of ulceration, and this sometimes extends along the walls of the pharyngo-laryngeal or pyramidal sinuses, quite to the entrance of the œsophagus. The follicles at the base of the tongue, which are often much enlarged, sometimes become ulcerated in like manner, as does also the mucous membrane covering the glosso-epiglottic sinuses at the sides of the glosso-epiglottic ligament. The secretion from all these surfaces becomes purulent; sometimes sanguinolent from rupture of superficial blood-vessels.

Fig. 36.



Chronic follicular pharyngitis.

The voice is sometimes affected in this disease, without any visible implication of the laryngeal structures, apparently resulting merely from an extension of the nervous influence of the pneumogastric nerve. This is evident from what is frequently observed to occur in public speakers. They gradually become hoarse during a prolonged or energetic harangue, and relieve the hoarseness at once by swallowing a little water. Now the water goes down the gullet, and not into the larynx. True, a little water, but a very little indeed, does sometimes trickle into the larynx down the inter-arytenoidal fold, but it is hardly enough to moisten the vocal cords and laryngeal mucous membrane sufficiently to account for the improvement in voice which follows the act. We have to fall back upon the theory that the impression made upon the divisions of the pneumogastric nerve distributed to the pharynx, œsophagus, and stomach, is propagated to those other branches distributed to the larynx. In the same manner, a pharyngeal irritation will produce hoarseness in a larynx apparently healthy in every respect. This I have seen again and again; and have often seen it follow the application of nitrate of silver to the surface of but one or two groups of enlarged pharyngeal follicles; as well, also, as result from a more extensive cauterization of the pharynx. This would seem to confirm the view of Prof. Green, that the relation of the pharynx with the respiratory passages is more intimate and important than its relation with the œsophagus; speaking in a pathological sense rather than an anatomical one. In these cases the voice becomes veiled at times, then muffled and hoarse; these symptoms continuing, it becomes a matter of difficulty to speak in a clear, distinct tone, and the effort is painful, the pain running from the region of the hyoid bone upwards on both sides. The voice may be a deep bass in the morning, and gradually rise to a shrill screech in the course of the day. Sometimes continued efforts to speak result in complete aphonia for the remainder of the day. At other times the patient wakes up in the morning aphonic or dysphonic, and as he engages in conversation his voice becomes gradually stronger, until towards the middle of the day it is almost natural in timbre, except that it is a little hoarse.

The subjects of these cases are usually such as have out-door employments requiring the use of the voice. It is not found so much in those who speak in-doors, unless there is a distinct laryngeal complication. We therefore meet it in military and naval officers, itinerant venders, conductors, newsboys, shopkeepers, and the like. If the affection is allowed to progress unrestrained, the larynx is sure to become involved eventually, and may then become more seriously affected than the pharynx was in the first instance.

The diagnosis is easy by ordinary, and by laryngoscopic inspection of the throat.

During the treatment of these cases the use of the voice should be interdicted, if possible, until the disease of the pharynx is well under control. Where the nature of the patient's occupation is such that necessity compels the use of the voice, care must be taken to make the least use of it possible under the circumstances, with the avoidance of prolonged talking at any one time. In order to secure compliance with an injunction of this kind, the patient should be distinctly informed that the use of the vocal organs during the treatment will greatly retard any progress towards a cure. It is the impossibility, in many instances, of securing rest to the parts that renders their treatment protracted and very often unsatisfactory. The habitual use of demulcent lozenges, such as those composed of the Iceland moss or the marsh-mallow, will often afford a good deal of relief and help to allay the irritability of the pneumogastric nerve. They can be made up by the confectioner in the form of gum-drops without the addition of sugar. Occasionally it may be advantageous to have a small quantity of lactucarium or conium incorporated into the mass, but then some restriction must be made as to the frequency of their use.

The function of swallowing is often impaired in this affection, and sometimes to such an extent as to be always attended with pain or with the production of sensations of a spasmodic character. At times there may even exist an inability to swallow. This dysphagia, in some instances, appears to be altogether of a nervous character, and in these cases particularly, though also in others, there may be unpleasant and even painful sensations similar to those produced by swallowing, independently of any act of deglutition. It is said that at times the spasm will amount to that of actual stricture, and that it will sometimes be impossible to introduce the sound, under such circumstances, without an amount of force which would not be justifiable; but I have not as yet encountered any cases of this nature. These cases are not instances of the ordinary spasmodic stricture of the œsophagus, which is unaccompanied with chronic pharyngitis as an essential element of the disorder, and which usually yields very readily to the introduction of the sound.

Generally the dysphagia is experienced only in swallowing hard and solid food; and by eating slowly and taking care to masticate each morsel thoroughly, so that it becomes well incorporated with a sufficient amount of saliva, deglutition can be rendered much more comfortable. Some patients experience so much trouble and uneasiness in swallowing even well-masticated food, that they resort in great measure to spoon food or liquid diet.

In some cases of dysphagia, where the affection has been of long standing, we observe a condition of the structures which in part accounts for it. We see a number of ulcerated places in various portions of the pharyngeal mucous membrane, these being irregular in outline, though more or less ovoidal in configuration, and being separated by continuous divisions of unabraded membrane, so that the patches of ulceration, when numerous and not yet run into each other, give somewhat the appearance of the interspaces of a network. The continuous stripes of mucous membrane are usually of a pale, yellowish color; the ulcerated spots have a fine red-lined margin, and in some of the interspaces which have not as yet undergone erosion, we see prominent red patches of hypertrophied glands and connective tissue.

In other cases the dysphagia seems to be due to a loss of muscular contractility, from absolute atrophy of the muscular tissue, or to a partial paralysis from infiltration between the muscular fibres. In these cases the posterior pharyngeal wall appears to be arranged in more or less regular vertical folds, rendered more prominent than they really are by reason of the divisions dipping down between them. These ridges are due to hypertrophic swelling of the connective-tissue sheaths of the muscular fibres, over which the mucous membrane sometimes becomes so much atrophied as to admit of the detection of the muscular striæ beneath it. Moreover, we find that there is sometimes an actual atrophy of the muscular tissue, so that the cavity of the pharynx is abnormally deep, and this excavation, as it were, is often confined to one side, most frequently the right side, according to my own observations. The condition of things is such at times as to convey the idea of a want of symmetry of the two sides of the spinal column, the outline of the constituents of which is sometimes distinctly discernible through the atrophied tissues. Sometimes, indeed, the closest examination, aided by palpation with the finger, has led to the conclusion that there was present either a case of absorption of the connective tissue between the pharynx and cervical vertebræ, as well as of the muscular tissue itself, or else a congenital prominence of one side of the spinal column. In addition to this striated appearance of the posterior pharyngeal wall, the parts may be studded with hypertrophied glands, intact or in process of ulceration, and accompanied with either a sound or eroded condition of the intervening tissue.

Impairment of hearing is at times an attendant upon chronic follicular pharyngitis, and this impairment is sometimes of a permanent character. Disease of the pharyngeal mucous membrane is, in fact, a very frequent cause of disease of the organ of hearing, especially of disease of the middle ear, which very often has its origin in a catarrhal inflammation of the nasopharyngeal mucous membrane. The lower portion of the mucous membrane lining the Eustachian tube, being continuous with the mucous membrane of the pharynx, without any line of demarcation, is very apt to take part in inflammatory affections of the pharynx, especially when occupying that portion in proximity to the orifice of the tube. Every inflammation occurring in this way is apt to be propagated along the tube, and thus to affect the structures of the middle ear. When there is chronic thickening of these parts, or even of the soft palate, the free opening of the Eustachian tube may be so pressed upon as to exclude the access of air into the interior of the middle ear, and thus lead to disease as a result of simple mechanical obstruction, without any active participation whatever in the disease of the pharynx. And even when the soft palate is not affected in this manner, the posterior palatine arch may be pushed backwards by an enlarged tonsil in such manner as to produce a similar occlusion of the orifice of the tube. The relations of the pharynx, the palate, and its posterior arch to the pharyngeal orifice of the Eustachian tube may be well studied in the representations given of rhinoscopic images.

The Eustachian tube, as it were, pushes through the posterior portion of the lateral wall of the pharynx for the distance of a centimetre or a centimetre and a half, just in front of the posterior wall of the pharynx, leaving a sort of recess between its posterior margin and the junction of the posterior and lateral walls of the pharynx, known anatomically as the recessus pharyngis lateralis, or fossa of Rosenmüller, the depth of which therefore depends upon the length of the tube projecting into the pharynx. This fossa is usually exceedingly distinct; but as a result of inflammation of the mucous membrane, adhesions take place between the two sides and produce bands of tissue which stretch from one side of the fossa to the other. In some cases the adhesion of the mucous membrane is continuous, so that the sulcus becomes obliterated, and there is no fossa of Rosenmüller at all. A similar obliteration may also exist as a result of hypertrophy of the glandular tissue, ofttimes so profuse in this situation.

Inflammation of the pharyngeal mucous membrane covering the tube may be very easily propagated around its edges into the interior of the tube, and thus lead to deposits and accumulations of mucus or lymph which by their mere presence, or by producing organic obstruction, prevent a maintenance of due atmospheric pressure on both sides of the tympanic membrane, and thus lead to impairment of hearing from disease of the tube or of the middle ear itself.

Uneasy sensations in the throat exist almost invariably to a greater or less extent, and they are described by patients in various manners. Some complain of pricking sensations; others of a feeling as if there were a hair or a bristle that they could not get rid of; many complain of heat and burning.

An elongated uvula, frequently coexistent with chronic follicular pharyngitis, often gives rise to distressing symptoms; although there are many cases of considerable elongation of this structure, even when it is long enough to lie a short distance upon the base of the tongue, which are not at all attended by any of the symptoms usually indicative of this condition. All the ordinary subjective symptoms of phthisis are said to have been produced in many instances by a simple elongation of the uvula; not only cough, but expectoration, and that not only mucous in character, but of a purulent, and even a sanguinolent character; attended with acceleration of the pulse, hectic fever, and emaciation. It is likely that these latter symptoms are not directly attributable to the elongation of the uvula, but to the depressing mental effect of a belief in the existence of pulmonary consumption on the part of the patient. This elongation, in most instances, does not include the muscular structure of the organ, but is limited to its mucous membrane and the submucous connective tissue, which, being greatly relaxed, form a sort of pouch filled with a serous or a sero-plastic infiltration below the azygos muscle. Sometimes the mucous membrane forms a sort of thin caudal extremity attached to the body of the uvula. Where the muscle itself is the seat of the infiltration, there is usually an increase in the transverse portion of the uvula, forming a condition of general hypertrophy and not elongation merely.

Professor Green mentions a case in which an enlarged and elongated uvula was over two inches in length, and nearly half an inch thick at its largest diameter.

A special form of chronic pharyngitis attended by a constant irritation in the throat, with a feeling of dryness, is that to which the name pharyngitis sicca has been given. It is characterized by a dry and glossy or highly polished appearance of the mucous membrane. The mucous membrane deprived of its complement of moisture becomes an exceedingly thin layer, and enables us to perceive the striæ of the constrictor muscles beneath it.

Particles of dust from the street or workshop are apt to accumulate on this dry glossy membrane, and as there is no secretion present to assist in their dislodgement, they become constant sources of irritation.

This condition is rarely met with in young people, but often exists in middle adult life, and still more frequently in elderly subjects.

Great relief is obtained by supplying to the parts that moisture in which they are deficient. This is to be done by the internal administration of remedies which excite the secretion from mucous membrane: such as cubebs, and other articles of its class; muriate of ammonia in small doses; iodide of potassium when not contra-indicated. The frequent inhalation of the steam from hot water will moisten the parts, and to a certain extent invite the local action of the systemic remedy; a process which is assisted still further by the frequent topical application of glycerine.

The treatment of chronic follicular pharyngitis is not always as successful as one would expect. This arises in part from the fact that the affection is rarely severe enough to induce the patient to follow strictly the advice of his physician. The affection, being eminently a chronic one, requires chronic treatment, and this the patient is unwilling to submit to. Again, inasmuch as the general health is often unimpaired, that is, as far as ability to continue at one's employment is concerned, avoidance of exposure to the causes of the affection cannot be secured. This is especially the case with those who gain their livelihood in great measure by the exercise of the voice. It is only when totally incapacitated for work that they submit to treatment, and then the mental depression under which they labor places a fresh impediment in the path of cure.

Constitutional and local treatment are both required in these cases. The functions of the skin, bowels, and other organs must be maintained in as normal a condition as possible, by attention to cleanliness, clothing, diet, and temperature; and when hygienic observances are insufficient, medicinal agents are to be resorted to for the purpose. Placidity of mind is an important feature in the treatment of clergymen, vocalists, and public speakers. Tonics, such as iron and quinine, are often required; and very often much benefit will result from the employment of phosphoric acid or some of its compounds. I have found phosphoric acid a remedy often equal to the control of nervous depression, and not infrequently a promoter of the appetite and digestion. The acid phosphate liquor prepared by Horsford has been very satisfactory in my hands for this purpose, and I have prescribed it frequently during the last two years. It is administered once or twice a day in teaspoonful doses, dissolved in a large goblet of water and sweetened to the taste. It forms a palatable acidulous drink, much relished by many patients; and its beneficial effects usually show themselves within a fortnight.

Local treatment seems, in most cases, absolutely necessary to effect riddance of the local trouble. Sometimes the effects are very prompt, and sometimes they are very slow. Even in cases where local treatment does not appear to induce any diminution in the size of the enlarged follicles, the benefit of the treatment in the relief of the subjective symptoms is often marked. In some cases no treatment whatever seems to have any beneficial effect on the symptoms, subjective or objective.

The most favorite and fashionable local treatment for chronic follicular pharyngitis consists in the topical application of the nitrate of silver; and although this method is much derided by some authors, there is no doubt that it is more efficacious than any other treatment they have suggested in substitution. Much depends upon the manner of application. This should be done slowly and carefully, and not in the off-hand way in which it is so frequently performed, gagging the patient and slopping it over structures which it was not intended to touch. The pharynx should be washed out by syringe or mop before the nitrate of silver is applied. This detaches the clumps of mucus adhering to the mucous membrane, and provides a clean surface for the deposition of the application, a very important point which is not often attended to. The nitrate of silver is usually applied in solution—a large sponge-mop or a brush being saturated with it—and then, after shaking off the superabundant liquid, swabbed over the parts as rapidly as possible, the tongue being depressed by means of a tongue-depressor, the handle of a spoon, or some other contrivance. A much better plan is to employ a small hair-pencil, or a very small piece of soft sponge, held in a pair of forceps, and to touch the hypertrophied follicles and the ulcerated spots, one after another, gently, carefully, and effectually. Enough of the fluid for the purpose will distribute itself over the adjacent membrane. To do this thoroughly may require several introductions of the instrument, a proceeding occupying a little time, to be sure, but one not so apt to be attended by gagging or spasms of suffocation, and much more apt to be beneficial in its effect. The nitrate of silver forms with the membrane an impermeable coating, which not only protects the parts from the air, and the secretions of the mouth, but exercises a gentle compression upon the enlarged follicle.

A solution varying from forty to sixty grains to the ounce may be used in the first instance, and, if deemed advisable, its strength may be increased to one hundred and twenty, or even, in some instances, four hundred and eighty grains to the ounce, which represents a saturated solution. The stronger solutions, as well as the solid stick, are used when it is desired to produce destruction of the tissue, and for this purpose must be maintained in contact for some seconds, and not removed immediately, as when a mere antiphlogistic or alterative effect is to be produced on the part. Any excess of the nitrate deposited on the part may be removed by touching it promptly with a solution of table salt or with milk. Although the applications of the nitrate of silver are in the main well borne, they sometimes produce a great deal of distress, occasionally actual spasm of the glottis, even when carefully performed, and without any possibility of a drop of the fluid having fallen into the larynx. For this reason it is well, when making an application to the parts for the first time, to test their sensibility by touching a single enlarged follicle, or group of follicles, and then proceeding further according to the indications. The application is to be repeated every day, or every two, three, or four days, as the case may seem to require.

When, after a fair trial of two or three weeks, these applications do not seem to be of any use, the plan may be adopted of splitting each follicle with the point of the knife, and then pressing the edge of a crystal of nitrate of silver, firmly secured, between the edges of the wound. In this way we bring the remedy in direct contact with the diseased structure, and effect its destruction or absorption more promptly than when the application is made to the mucous membrane covering it.

The chloride of gold in some instances forms a good substitute for the nitrate of silver, and may be tried when the latter fails. It is used in solution of a strength varying from fifteen to sixty grains to the ounce.

Chloride of zinc, iodide of zinc, sulphate of zinc, sulphate of copper, and many other remedies have been proposed as substitutes for nitrate of silver, and they often do good service; but they cannot replace it in the majority of cases.

In addition to this local treatment, the projection upon the parts, two or three times a day, of sprays of weak astringent solutions, such as alum, tannin especially, sulphates of zinc or copper, acetate of lead, etc., do excellent service, keeping up an astringent effect upon the tissues.

In obstinate cases, it is often advisable to add to the constitutional treatment the employment of iodide of potassium, which will sometimes have a very satisfactory effect, and this will be heightened, in certain instances, by the bichloride of mercury in small doses, even when there is no evidence of syphilitic taint, and independently of any condition of that kind.

The local treatment is also assisted frequently by the use of blisters, or other counter-irritation, externally, to the nape of the neck, or in front of the larynx.

For the pain and local annoyance, lozenges containing opium, hyoscyamus, conium, lactucarium, etc., or chlorate of potassa, bromide of potassium, muriate of ammonia, and the like, may be allowed to dissolve in the mouth from time to time. Chocolate forms a good medium for the lozenge.

GLANDULAR HYPERTROPHY AT THE VAULT OF THE PHARYNX.

The glandular tissue at the vault of the pharynx is apt to take on simple hypertrophy, or to become elongated into clusters of hypertrophied glands, which may be designated as follicular vegetations. The symptoms of this affection are similar in the main to those attending a protracted coryza, or cold in the head, except that there is very little discharge of mucus from the nostrils; the mucus in these cases being expectorated through the mouth. There is more or less impediment to free nasal respiration, compelling the patient at times to keep the mouth opened slightly so as to secure freedom of breathing. Occasionally there will be impossibility of sleeping on one side or the other, from stoppage of one of the posterior nasal openings, by the dropping or falling over it of these pendant vegetations. There will be a feeling of fulness at the posterior portion of the nares above the palate, the sensation being that of some foreign material, of which the patient endeavors to rid himself by a peculiar stridulous nasal inspiration, so as to drive the offending body into the throat; this movement being followed by a hawking and spitting, to eject whatever may have been driven into the pharynx. The expectoration will consist of lumps of mucus more or less thickened, and sometimes streaked with blood. In marked cases of the affection, there will be a deficiency in the enunciation of the nasal sounds of speech, the tones of *m* and *n* sounding like those of *b* and *d*. If the disease has existed for some time, some disfigurement in the external conformation of the nose may have ensued, the upper portion of which will be compressed from side to side, and the lower portion flattened from before backwards, seeming broader than it really is from the contrast to the upper portion. In some cases there is more or less impairment in hearing, from obstruction of the pharyngeal orifice of the Eustachian tube. This deafness is sometimes associated with tinnitus aurium. Sometimes there will be spitting of blood, inasmuch as the vegetations bleed very readily and may be excited to hemorrhage by the movements of hawking.

On looking into the throat, there will usually be perceived more or less evidence of chronic follicular pharyngitis, the follicles being enlarged in elongated puffy-looking masses; and as the palate is raised, thick clumps of a greenish-yellow mucus will often be seen making their way downward upon the posterior wall of the pharynx. Masses of this kind are often hawked down into the mouth and expectorated. In some instances the palate will be found much thickened, especially on its posterior wall.

The existence of a follicular structure at the roof of the pharynx has long been known. Prof. Green speaks of it in his admirable monograph on follicular disease of the pharyngo-laryngeal membrane; and many other authors mention the existence of a mass of glandular tissue in this region, which is described simply as a chain of glands extending across the pharynx from one Eustachian outlet to the other. The importance of this tissue, however, in a pathological point of view has been fully recognized only since the introduction of the rhinoscope as an instrument of diagnosis; and a number of cases are recorded by Voltolini and others in which the disease under consideration was unexpectedly discovered during a rhinoscopic examination, either for disease of the naso-pharyngeal region, or for disease of the ear affecting the Eustachian tubes. In some instances the condition was discovered while employing the rhinoscope to ascertain the position of the pharyngeal orifices of the Eustachian tube, for the purpose of verifying or assisting the introduction of the Eustachian catheter.

In view, therefore, of the importance of the subject, and the almost universal want of a description of this region in our works on anatomy, it is to be hoped that it will not be out of place to present such an anatomical description here. A very good account by Prof. Ch. Robin will be found in the *Dictionnaire de médecine* of Nysten, 11th (1855) and subsequent editions, under the article *pharynx*.

The best description, however, is given by Prof. Luschka,[1] who has recently added some new observations[2] which we translate for the benefit of our readers, in the absence of any other published account of it in the vernacular.

---

[1] Der Schlundkopf der Menschen. 4to. Tübingen, 1868.

[2] Sur le tissu adénoide de la parte nasale du pharynx de l'homme.—*Journal de l'Anat. et de la Physiol.*, 1869. No. 3. May and June, p. 225.

"As the nasal portion of the human pharynx is now capable of exposure to ocular inspection during life, an exact acquaintance with the normal condition of the walls of the pharyngo-nasal space has become indispensable.

"Not only has our knowledge of this region been hitherto very imperfect, but it has even been impossible to establish an accord between the diverse opinions maintained, especially as regards the nature of its texture. In the majority of treatises and manuals of anatomy, the general configuration of the superior surface of the vault of the pharynx itself is either not described at all, or else but very meagrely; authors contenting themselves by repeating, after Rosenmüller, that behind the pharyngeal orifice of the Eustachian tube, the mucous membrane forms a depression of a greater or less depth.

"In view of the inaccessibility of this region, it is not to be wondered at that so few facts are known relative to its pathological modifications.

"In certain maladies which, as diphtheria, extend so readily from the tissues of the fauces to those of the nasal fossæ, there is strong presumption that the adenoid substance of the vault of the pharynx is attacked not less than that of the tonsils.

"For the prosecution of researches of this nature, a method of examination is required which shall permit a complete exploration of the fully exposed vault of the pharynx, without too great a mutilation of the cadaver, which is rarely abandoned to the full disposition of the practitioner. The most expeditious procedure, entailing least injury to the cadaver, is, according to my experience, as follows:—

"An incision is made under the jaw, from the lobule of one ear to the other; the soft parts are detached from the inferior maxilla; and then, after disarticulation of this bone, the tissues forming the floor of the buccal cavity are separated and removed, together with the palate and adjacent segments of the septum of the nasal fossæ.[1]

---

[1] Hubert von Luschka. *Der Schlundkopf des Menschen.* Tübingen, 1868, 4to. p. 4 *et seq.*, pl. i. ad xii.

"The internal surface of the vault of the pharynx thus exposed is usually coated with a glutinous mucus, which it is necessary to remove in order to gain a true conception of the nature of the tissues.

"Although the inequality of the grayish or brownish-red surface is at once remarked, it is not until after hardening by prolonged immersion in alcohol, or chromic acid, that, having examined in all their details the peculiarities of the exterior forms, we can appreciate with exactness the recent condition.

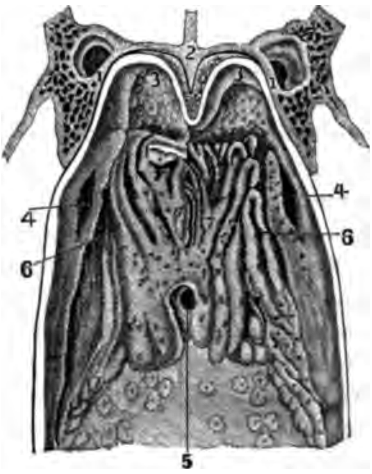
"By means of these preparations we can distinguish the definite limit which separates the extremity of the roof of the nasal cavity from the vault of the pharynx to which it is united. Most frequently this line of separation is a distinct notch or furrow, behind which the substance of the pharyngeal vault inclines downwards, passing the roof of the nasal cavity to a variable distance, the maximum being 4½ millimetres; a sort of rampart thus forming a separating line between these two neighboring cavities.

"The adenoid substance of the nasal portion of the pharynx extends with a uniform aspect to the middle of the border of the great occipital foramen; it descends even as far as the region of the anterior arc of the atlas, where it terminates, sometimes in the form of an uneven irregular line, forming more or less of a prominence upon the adjacent structures, sometimes resolving into isolated follicles, and becoming insensibly merged into these structures.

"On the sides, the adenoid substance extends towards the orifice of the Eustachian tubes, and forms with the posterior reflexion of its circumference a fissure of greater or less depth, *recessus, seu lacuna pharyngis*, or fossa of Rosenmüller (Fig. 37—6), which joins, above, the sort of rampart of which we have spoken, and is continuous below with the furrow or notch formed by the junction of the posterior and lateral walls of the pharynx.

"This *recessus pharyngis*, arising from the projection of the Eustachian tube in the cavity of the pharynx (the maximum of its depth, which diminishes successively above as below, not exceeding a depth of 1½ centimetre), corresponds to the length of that portion of the cartilage of the tube covered by the pharyngeal mucous membrane. Frequently this recess is not uninterrupted in its entire length, but is divided by bridges formed of mucous membrane, and uniting the posterior wall of the nasal portion of the pharynx to the neighboring reflexion of the pharyngeal orifice of the Eustachian tube which faces it. The more numerous these junctions, the more does the adenoid tissue cover this portion of the circumference of the tube, the polish of which disappears; there is no longer a distinct limit to the adjacent tissues, so that the recessus pharyngis may be entirely wanting.

Fig. 37.



ADENOID TISSUE OF VAULT OF PHARYNX, from Luschka.

Fig. 37. Posterior wall of the superior portion of the human pharynx, seen from before backwards, upon a transverral section. Natural size, after Luschka.—1-1. *Pterygoid process.* —2. *Section of the vomer.*—3-3. *Posterior portion of the vault of the nasal fossæ.*—4-4. *Pharyngeal orifice of the Eustachian tube.*—5. *Orifice of the pharyngeal pouch* (Bursa pharyngea.)—6-6. *Recessus pharyngeus* (fossa of Rosenmüller.)—7. *Median folds formed by the adenoid substance of the nasal portion of the pharynx.*

"The free surface of the nasal portion of the pharynx, extending between the orifices of the two Eustachian tubes and descending from the extremity of the nasal cavities to the anterior border of the great occipital foramen, does not always present the same aspect, even in normal conditions. In a very few instances we see the surface delicately crossed by deep clefts longitudinally directed, forming leaves separated by these clefts, or projecting ridges which reunite in part by the formation of a sort of network. Most frequently we observe a mamelonated surface interrupted by short fissures, often irregular, and varying in number and position. Whether we have the one type or the other, the free surfaces, as well as those bordering upon the clefts, are studded with innumerable white nodosities, hardly of the size of a poppy-seed. These are the follicles of the adenoid substance, and present a fine glandulous appearance. We observe, in addition, a great number of round pores, formed in part by the isolated follicles of the depressed mucous membrane and in part, and principally, by the mouths of so many acinous glands.

"Almost always a much larger orifice is noticed in the region of the adenoid tissue, and it is situated at the inferior limit of its median line (Fig. 37—5). It is sometimes circular, and its diameter is that of a pin-head; sometimes it appears larger, and is not often defined, except above, by a more or less distinct border. This opening represents the entrance of an appendix of the vault of the pharynx, in the form of a pouch, oblong, having a maximum length of 1½ centimetre, and 6 millimetres in breadth, which, joined by a cushion of loose cellular tissue to the adenoid substance, rises behind it towards the body of the occipital bone, where it terminates by a narrow extremity, sometimes pointed, penetrating the external fibrous element of this bone. At its posterior portion this pouch is ordinarily enveloped by acinous glands.

"Sometimes its sides are surrounded by a muscle, arising by a flat tendon of fibrous tissue from the inferior surface of the basilar apophysis. This muscle, which exists only exceptionally, may be considered as the superior bundle of the cephalo-pharyngeal muscle; a bundle enveloping in the form of a knot the lateral portions of the vault of the pharynx. The lateral extremity of the cephalo-pharyngeal muscle arises within the Eustachian tube, towards the root of the internal plate of the pterygoid apophysis.

"It was in certain mammifers (horse? *Tr.*) provided with this appendix of the vault of the pharynx, that F. J. C. Mayer observed it for the first time; and he gave it the name of the *pharyngeal bursa.*

"We often notice on the external face of the body of the occipital bone, in front of the pharyngeal tubercle, a little fossa corresponding to the superior extremity of the appendix; and which, upon a cranium of a Bushwoman which is before me, has a depth of several millimetres, and is prolonged anteriorly under the form of a gutter. T. H. Tourtal has also observed, upon the craniums of a Bushman and a Caffray, the exceptional development of this fossette, the imprint of the pharyngeal bursa.

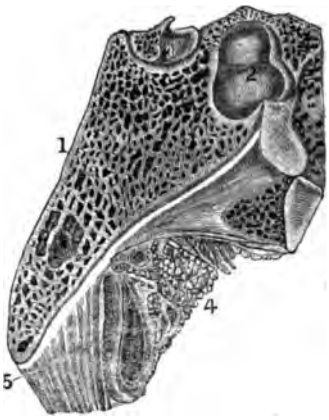
"The wall of the pharyngeal bursa (Fig. 38), formed especially of adenoid substance, has a thickness varying from $\frac{1}{2}$ to $1\frac{1}{2}$ millimetre; its mucous membrane is not generally uniform, but provided with irregular projecting tubercles, and folded in longitudinal plaits. Sometimes the contracted superior extremities become strangulated, and transformed into a cyst. In one case that I observed, this strangulation was repeated several times, giving a knotted aspect to the pharyngeal bursa. This modification recalls the irregularly interrupted obliteration of the vaginal tunic of the peritonæum, producing cystic hydrocele of the spermatic cord; it also recalls the swellings of the median ligament of the bladder remaining attached to the urachus, and of which a portion is normally free for a certain length. It is not doubtful that this appendix is but a fœtal relic without functional importance, a condition also indicated by the possibility of its absence, and by the variability of its dimensions. It is confirmative of the hypothesis of Rathke, that the glandular lobe of the pituitary body is especially produced through a strangulation of the mucous membrane of the pharynx; and we may the less rest our hypothesis on the genetic relation of the pharyngeal bursa to the pituitary body, inasmuch as I have demonstrated in the fœtus the existence of this excavation, which is developed by growth at a later date.[1] Thus we negative absolutely the question propounded by Tourtal:—as to whether there is not some relation between the pharyngeal bursa and the development of the cavity of the sphenoid bone.

"The opinions of anatomists upon the *structure of the walls of the vault of the pharynx* are divided. Some admit the presence of a conglobate glandular substance, and others deny it. While Kölliker finds, in accordance with Lacauchie, a glandular mass having the structure of the tonsils, at the place where the pharynx attaches itself to the base of the cranium, Henle affirms that he has but rarely found some small flattened depressions at the superior portion of the pharynx of an aspect analogous to that which the follicles of the intestine present when they have been destroyed. But this observer was unable to find a conglobated glandular substance, either in the walls of these depressions, or about the excavations proper to the vault of the pharynx.

---

[1] The Pituitary Body and the Coccygeal Gland. Luschka. Berlin, 1860, 4to, pl. i. and ii.

Fig. 38.



Pharyngeal Bursa (from Luschka).

Figure 38.—Antero-postero section of the vault of the pharynx. Natural size, after Luschka. 1. Section of the basilar process of the occipital bone. 2. Body of the sphenoid. 3. Pituitary gland. 4. Adenoid substance of the vault of the pharynx, behind which is seen, 5. The pharyngeal bursa.

N.B.—The line of reference from 5 is carried beyond the bursa in the cut.

"In view of this controversy between celebrated anatomists upon so important a point, and in consideration of the variable forms under which this substance is produced in the various regions of the body, I deemed it my duty to extend my personal researches over a great number of cadavers procured from individuals of different ages. I arrived, in every case, to the one result: in complete opposition to the opinion of Henle. I invariably found a large conglobated glandular mass, attaining a maximum thickness of 8 millimetres, and extending between the orifices of the Eustachian tubes, with a medium length of 3 centimetres, departing from the posterior extremity of the roof of the nasal cavity. This glandular substance, soft and spongy, is so intimately connected with the solid cartilaginous tissue which unites the pharynx to the base of the cranium, that it is almost impossible to separate them distinctly. It is not possible to isolate the mucous membrane, the tissue of which loses itself without interruption in the connective reticular substance; and it is, almost to the very surface, so infiltrated with cellules similar to the lymphatic corpuscles, that it seems to be nothing else than a thin limiting structure surmounted with flat papules hardly perceptible, and covered with lengthened vibratile cellules.

"The greater portion of the glandular tissue is formed either of leaves separated by deep clefts, or of round pockets, more or less distinct, with walls of the medium thickness of 1 millimetre, embracing cavities lined with vibratile epithelium, in which the mucous membrane prolongs itself through relatively straight openings. These round pockets, produced by the penetration of the mucous membrane, and attaining to the size of a pea, are in part separated by thin layers of the ordinary fibrous connective tissue, which makes them in some sort isolable; in part, especially towards the surface, they become lost in one another without interruption, so that the conglobated glandular substance of their walls appears continuous, and penetrated by an irregular system of cavities, terminating by numerous openings in the free surface of the mucous membrane. Under both conditions we have always a system of thin cordons, united to each other in the form of a network, in the meshes of which are found elements similar to the lymphatic corpuscles, and in such abundance that they conceal everything else.

"In this substance, constituted as it may be, as the analogous substance of the lymphatic apparatus called after His 'adenoid tissue,' or with Henle, 'conglobated glandular substance,' are found small nodosities of the same nature as the solitary follicles of the intestine, and identical with them under all relations. These nodosities, of variable quantity, but never absent, are softer than the rest of the substance, and are distinguished in the recent state by a whitish color. Their size is variable; normally they do not surpass that of a poppy-seed; but under an abnormal influence, the increase of size may be very great. They show themselves intact at the surface of the vault of the pharynx, and if they are sufficiently numerous, they give it a granular appearance. In a section of a hardened preparation, showing most clearly the separation of the isolated pockets, the disposition of these nodosities may be readily seen in the walls of these pockets, as well as the prominence of a certain number towards the cavities of these last, where they advance more or less deeply, under the form of rounded eminences.

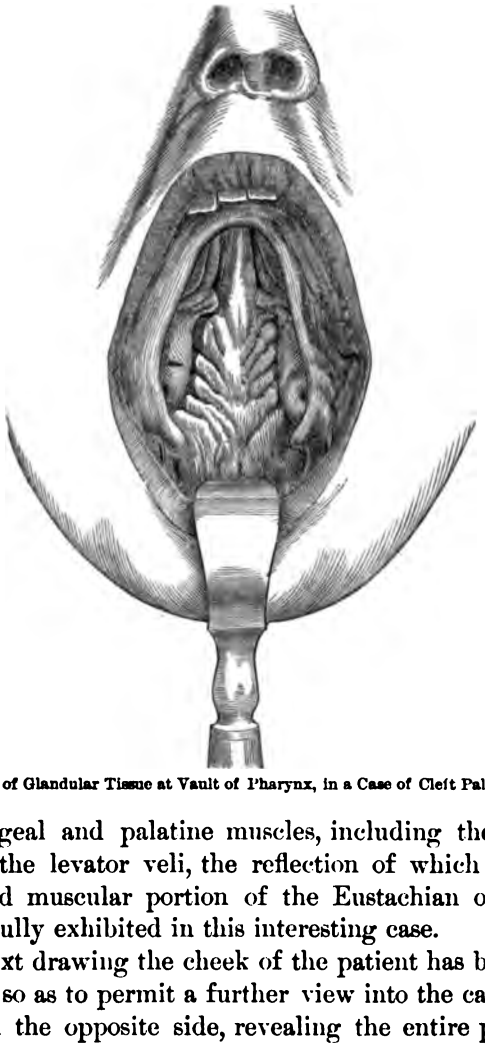
"Like the solitary glands of the intestine, these nodosities are not distinctly separated by the eye from the surrounding tissues.

In fact they do not appear in their extent, except bound to the cellular network by some thickenings of this tissue. But their fundamental tissue is the same as that of the neighboring structures, a network continuous with the ambient portions, and which becomes more delicate as it embraces the larger meshes, and approaches more to the centre. Towards the middle the network is most frequently lost entirely, in such fashion as to produce a sort of common central space.

"In general, the little vessels sustained by the network do not extend, as it were, to the woof, but become inflected towards the centre, and are most frequently sinuous. It sometimes occurs, however, that the capillaries, united among themselves in the form of a reticulum, penetrate the space left free by the network. This network consists of colonnettes of greater or lesser size, partly in continuation with the external tunic of the vessels, the relations of which cannot be distinguished except in preparations hardened in absolute alcohol; and a certain number of these colonnettes unite to form a knot, sometimes dilated. Though recognizing that the filaments of cellular tissue are the principal constituent elements of these nodosities, it is also necessary to remark that there enter into their formation cellular elements, the prolongations of which penetrate into the woof of the reticulum. I am not at present prepared to pronounce upon the primitive disposition of the reticulum of the adenoid substance of the pharynx, and to say whether it represents, or to what extent it represents, a pure cellular network, such as it would seem to be with the lymphatic glands, according to the recent embryological researches of E. Sertoli upon the development of these organs.

"The reticulum of the follicles in the walls of the glandular pouches of the pharynx is infiltrated with elements which, by their size, their form, their reaction, resemble the lymph corpuscles. Their exaggerated increase may, if they coincide with the disappearance of the fibrous support, give rise to the production of pouches of a greater extent, of which the contents, sometimes presenting the consistence and color of a caseous substance, at times evince a colloid degeneration. The disappearance of the conglobated glandular substance is frequently the left side of the pharynx, seen less distinctly upon the right, is the lower portion of the salpingo-pharyngeus muscle, which, arising from the posterior and cartilaginous portion of the tube, descends to the sides of the pharynx. The action of all the pharyngeal and palatine muscles, including the posterior portion of the levator veli, the reflection of which forms the anterior and muscular portion of the Eustachian orifice, was also beautifully exhibited in this interesting case.

Fig. 39.

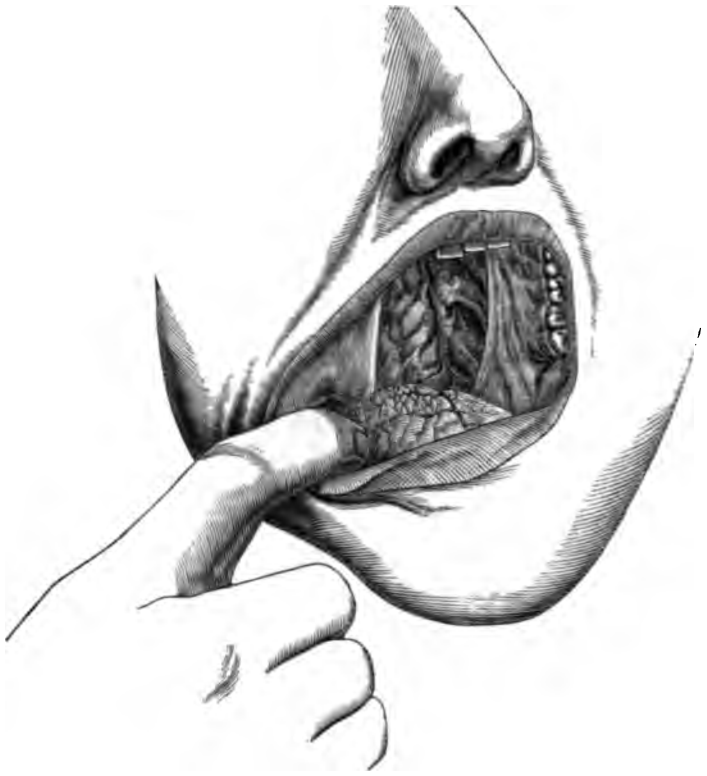


View of Glandular Tissue at Vault of Pharynx, in a Case of Cleft Palate.

In the next drawing the cheek of the patient has been drawn to one side, so as to permit a further view into the cavity of the pharynx on the opposite side, revealing the entire pharyngeal extremity of the Eustachian tube, and the whole of its orifice.

This drawing was also touched up by Dr. Packard before being finally submitted to the engraver.

Fig. 40.



View of Left Eustachian Orifice in a Case of Cleft of Hard Palate.

This case is the one operated upon by splitting the edges of the cleft instead of paring them, already referred to under the head of cleft palate.

It will be seen in the drawings, that the tissue in this instance is arranged symmetrically on either side, in the form of five or six elongated club-shaped lobes on each side, with the bases upwards and outwards, and the narrower extensions running downwards, and inwards towards each other, the clefts or lines of separation between these lobes being distinctly marked and running together to form a median cleft of greater depth and width. The entire mass was of a brilliant red color, similar to that of vascular mucous membrane. The dividing spaces or clefts were occupied by a slightly opalescent fluid, secreted from the glands; and where the different streams joined in the central cleft and ran down the posterior portion of the structure, the opalescence was marked and milky in appearance. On removing this secretion with a sponge, the adjacent surfaces of the lobes were seen to have a slightly wrinkled aspect, as if minutely furrowed, and the bottoms of the clefts were of the same color as the lobes. The secretion reaccumulated under the eye with great rapidity. The appearance bears a striking resemblance to that described by Luschka from observations upcn the dead subject; but there was no vestige to be seen, even with the aid of a magnifying lens, of any central depression or pit marking the orifice of the pharyngeal bursa. There is not the slightest doubt that we have in this case a marked exemplification, in situ, of this adenoid or glandular tissue of the nasal portion of the pharynx; but evidently in a slight state of hypertrophy from the local irritation to which it has been subjected, during the whole life of the patient, on account of its exposed situation. It will be an interesting source of supplemental observation to watch, with the rhinoscope, for the retrocession of this structure to its normal dimensions, following the closure of the cleft in the palate.

Although the presence of this structure,—this "pharyngeal tonsil" as it has been not inaptly termed,—has been discerned frequently upon rhinoscopic examination of the healthy subject, it cannot by any means be distinguished in all cases; but experience teaches me that if always hunted for it will be frequently recognized, even though there may be at first only doubtful evidence of its presence. It is not always recognizable in cases of cleft-palate. In one or two cases of this kind, in which I looked for it again and again by reflected light, I could not convince myself of any manifestation of its appearance. I have frequently observed it, however, in the rhinoscopic image, and have distinctly recognized, in a few instances, the central depression of the pharyngeal bursa.

As a usual thing no distinct line of demarcation between the nasal portion of the pharynx and the vault of the pharynx can be recognized, the parts merging into each other by a smooth uninterrupted surface; but sometimes a deep furrow is distinctly seen in this situation, separating these two portions of the pharyngeal cavity. In one case of this kind, recently under the author's treatment, not only was this furrow well marked, but it was crossed on either side of the middle line, just above the roof of the nasal openings, by several delicate bands of tissue, similar in appearance to those bands so often seen crossing the fossa of Rosenmüller—a condition also existing in the case referred to. This patient applied for relief from an annoyance of many years' duration, the principal symptom of which was a constant dropping of mucus from the posterior nasal region into the throat; sometimes entering the larynx and inducing cough. A rhinoscopic examination revealed the condition of parts just described, as well as the existence of a fimbriated elongation of some of the follicles composing the glandular mass at the vault of the pharynx. The parts were normal in color, and the disease confined to this locality. The secretion from these glands accumulated on the little bridges formed by the bands of adhesion, and when collected into drops fell from them into the throat.

The treatment consisted in rupturing these adhesions by means of a blunt, catheter-like metallic probe passed behind the palate, followed by the projection upon the parts of a tolerably strong solution of carbolic acid in glycerine and water.

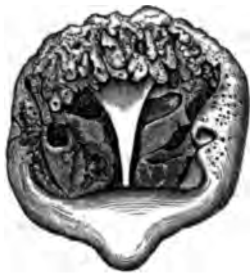
Of the form of affection under consideration, with the existence of which I have been familiar for four or five years only, I have seen some thirty cases or more, principally in adult males. In some instances these vegetations exist in but a slight amount; but I have frequently seen them studding the entire vault of the pharynx from side to side, hanging over the upper margins of the posterior nasal orifices, and completely hiding the view of the pharyngeal orifice of the Eustachian tube; and as has been the case with Voltolini and others, I have discerned them unexpectedly in examinations of this region in patients suffering from chronic catarrh of the middle ear. In some instances they are said to be so numerous as to fill up the entire upper cavity of the pharynx, and to give to the finger, when passed behind the velum, the sensation of bunches of earthworms. I have never met with them in anything like this profusion. Dr. William Meyer, of Copenhagen, has described this affection in an elaborate article entitled "Adenoid Vegetations in the Naso-pharyngeal Cavity;"[1] his attention having been first called to it as the cause of the defect in speech, mentioned in the early part of this article as one of the symptoms of the affection. He states that he has met with 102 cases of the disease in his private practice within a period of eighteen months after his attention had been directed to the disease in his first case—a remarkable number, certainly; for before the perusal of his article I was inclined to the belief that the affection was an infrequent one, judging from my own experience, that of friends with whom I had conversed on the subject, and the small number of published cases on record. Dr. Meyer examined 2,000 children in the public schools for the poor in Copenhagen, and discovered 20 of them with the peculiar defect of enunciation which he calls "*dead*" *pronunciation*, in all of whom he met with the existence of these adenoid vegetations. Dr. Meyer states that he has met them almost completely filling up the naso-pharyngeal cavity behind the velum, and giving to his finger a sensation much like that of a bunch of earth-worms. In fact, he depends upon his finger as a means of diagnosis much more than he does upon the rhinoscope; for he states that they are sometimes so extensive as to preclude the use of this instrument, and that in some instances the velum is so thickened on its posterior surface that it encroaches too much upon the cavity to admit the mirror, even when the space itself is not so fully occupied by the vegetations.

These glandular enlargements are sometimes flattish cushions, similar to the prominences seen in some cases of follicular disease of the middle and lower portion of the pharynx. Some-

---

[1] *Hospitals Tidende*, Nov. 4, and 11, 1868. Extensively reviewed in *Schmidt's Jahrb.*, 141, 1869, p. 325. Communicated in English in *Medico-Chirurgical Transactions*, p. 191. London, 1870. Illustrated.

Fig. 41.



Rhinoscopic View of Glandular Vegetations at Vault of Pharynx.

times they are cylindrical, and very often indeed fimbriated, hanging down like irregular tassellated fringes. (Fig. 41.) Sometimes they are isolated, at others in close apposition. They are usually of soft consistence and bleed very freely on contact with the sponge, or even when struck with a stream of fluid projected upon them from the syringe. They usually occupy the vault of the pharynx, and the sides of the cavity overhanging the cartilaginous projection of the Eustachian tube, and the fossa of Rosenmüller. I have never seen them occupy the nasal septum, and Dr. Meyer states that he has never seen them there in his extensive experience; but he states that in some cases he has traced them down the posterior pillar of the palate to the level of the tonsil, and in a few instances on the upper surface of the soft palate, and he also mentions that he sometimes finds these growths hard as well as soft in texture. All that the author has seen have been of soft consistence. The color of these vegetations is of a deep red at the base, shading off to a lighter pink or to a yellowish cast at the apex. They have much the color of the free surface of the tonsil. Their free surfaces are usually smooth, but sometimes exhibit that velvety appearance that is often seen in the follicular enlargements of chronic pharyngitis.

Dr. Meyer has carefully examined the microscopic appearances of these vegetations, and it may be well to compare his description with that of the normal tissue as already given from the observations of Luschka. Meyer says,[1] "the surface of a section of a recent specimen is generally smooth, and shows no laminæ or divisions in the tissue. Frequently small round yellowish spots may be seen, or cup-like depressions, varying in size but always small. The juice pressed out of the section is mostly inconsiderable; it is transparent, and contains innumerable lymph corpuscles. In fine specimens of sections hardened in alcohol or dilute solutions of chromic acid the light-colored spots are much more distinct. The spots themselves are sometimes pierced by a hole varying from the size of the point of a pin to 1—1½ mm. in diameter, or they are absent altogether, whilst holes of the same dimensions as the spots take their place.

---

[1] *Med.-Chir. Trans.* 1870, p. 196.

"In preparations gently brushed with a sable-hair brush, and then tinged with carmine, a very transparent delicate network is seen, the meshes of which either contain more or fewer lymph-cells or are entirely empty where the brush has swept these out. In other growths, especially in those of the side-walls, the threads of the network are coarser and the meshes smaller; these growths were further distinguished by the appearance of genuine and sometimes rather firm areolar tissue. The little perforations above mentioned are the cavities of normal or enlarged follicles, from the compact capsule of which the network extends more or less into the cavity, growing more delicate as it proceeds inwards. The excretory ducts of aciniform glands are also seen in great numbers, being easily recognized by their beautiful epithelial lining. Most specimens are extremely vascular, containing arteries, capillaries, and, still more, veins, as distinguishable by the direction and character of their parietal nuclei. Some growths even, especially those of the posterior wall, seem to be made up exclusively of blood-vessels, between the numerous ramifications of which a scanty areolar network containing lymph-cells is interspersed. The connection between the meshes and the outer areolar coat or perivascular areolar tissue of the blood-vessels can often be easily perceived. The epithelium covering the vegetations is sometimes ciliated, showing wonderfully distinct cilia, and sometimes of the pavement form, composed of very large cells. In some specimens both forms are met with, either separated from each other by a well-marked line or by some transitory epithelial cell-forms. Thus the microscopical characters may, in a certain degree, point out the spot from which the growth had sprung. Sometimes the follicles are so near the surface that only a very delicate lining membrane exists between their walls and the epithelium."

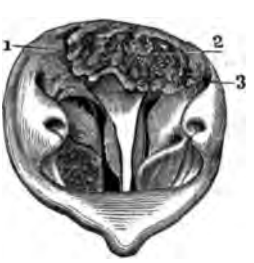
Treatment.—The treatment of these vegetations consists in destroying them by caustics, and in removing them by surgical operation. The cauterization may be performed with the solid nitrate of silver conveyed to the parts, under guidance of rhinoscopy, by means of a curved probe, which has been dipped into the melted caustic, or upon one of the caustic-holders described in connection with the discussion of instruments employed in cauterizing the larynx. Astringent powders may be propelled upon the parts in like manner, from the insufflator of Rauchfuss. Astringent solutions may be injected upon the parts by the posterior nasal syringe. I have employed, in this way, tannin, carbolic acid, sulphate of zinc and of copper, calomel, and weak solutions of nitrate of silver. Strong solutions of nitrate of silver are not always well borne by any means, and often produce an intense amount of suffering, which sometimes continues in the form of an excruciating headache for a day and more. Sneezing is very often produced by these applications, and sometimes continues for many minutes. It is well to test the sensibilities of the parts by weak applications, resorting to stronger ones as tolerance is established.

Where the vegetations are large, and the parts can be educated to quietude under manipulation, these growths can sometimes be seized with properly curved forceps and be torn off or crushed off as the case may be. Under these circumstances there is usually more or less hemorrhage, but I have not encountered it to any such extent as to excite alarm or uneasiness. Sometimes I have scraped them off with a blunt instrument resembling a vesical sound. After an operation of this kind I have usually projected powdered alum upon the parts, or syringed them with a weak solution of carbolic acid. A slight amount of hemorrhage continues, usually, for some hours, tinging the mucus and saliva which is expectorated. A number of operations are usually necessary in order to rid the pharynx of these growths.

Fig. 42 represents a case recently treated by the author, in which the mass was torn off by short laryngeal forceps and then cauterized thoroughly with nitrate of silver, giving complete relief to an unpleasant "nasal catarrh" which had existed for ten or twelve years.

Dr. Meyer describes an instrument, of which he gives an illustration,[1] devised by him for scraping off the larger vegetations. It consists of a little transverse oval ring with one sharp edge, and attached to a straight stem. It is carried to the parts through the nostril and guided in its operation by the fore-finger passed up behind the palate. The stem of the instrument is composed of soft steel, so that it can be bent to one side or the other as may be desirable to facilitate manipulation. The hemorrhage in this operation is considerable, and most of it flows out of the nostrils. After the operation, the parts should be well washed with a rose syringe, or with the nasal douche, and they may then be cauterized should this seem necessary.

Fig. 42.



Rhinoscopic view of a case of glandular hypertrophy at vault of pharynx. 1. Enlarged glandular mass. 2. Lobes studded with yellow spots, simulating concretions. 3. Fossa of Rosenmüller. This case shows also œdema of the membrane of the septum narium.

The whole history of operations of this kind is too recent to permit the formation of an opinion as to the repullulation of the growths. The general impression, however, is that there is no disposition to return.

TUMORS OF THE PHARYNX.

Tumors of various kinds, benign and malignant, are liable to be formed in the pharynx as in other situations. They are usually developed in the sub-mucous connective tissue; but sometimes take their origin from the bones. The mucous membrane of the pharynx compresses them so tightly that they are not very movable. They appear to occur much more frequently upon the lateral walls of the pharynx than posteriorly, and when thus located often involve the palatine arches.

These tumors are not often recognized until after they have attained a considerable size, interfering with deglutition and respiration if low down, and with distinct articulation if high up. Inspection of the parts, with the aid of palpation, suffices for the diagnosis. They may extend upwards to the region of the posterior nares and Eustachian tubes, or downwards to the root of the tongue, the epiglottis, or the walls of the larynx and œsophagus. When occupying the lateral wall of the pharynx they may be confounded with tumors of the tonsils.

---

[1] *Med.-Chir. Trans.* 1870, p. 212.

The treatment of these tumors, when not malignant, consists in their extirpation; and the operation may present but little difficulty, or be extremely embarrassing, in accordance with the situation of the tumor, the nature of its attachments, and its proximity to the carotid artery. Indeed in some cases of tumors in this situation, it has been found expedient to ligate the carotid artery as a preliminary measure; and in others its ligation has become necessary during the performance of the operation, or subsequent to it. In simple cases all that is necessary is to expose the growth freely by a straight or crucial incision, as the case may demand, through its mucous coverings, and to complete the extirpation, as far as may be, by means of the fingers, aided with the handle of the scalpel, or with some other blunt instrument. Where it has been required to cut through the soft palate, it is sometimes necessary to unite the edges of this structure by means of the ligature.

Most of the tumors operated on in this region have been of a fibroid character; and in some instances have been followed by a recurrence of similar growth, necessitating further operation. In a case of the latter kind, recorded by Wagner,[1] death occurred by suffocation during a second operation, performed five months after the first one. The cause of death was found to have been due to pressure of the epiglottis upon the laryngeal orifice, by a portion of the tumor which had been dragged out in the operation.

Osseous tumors are occasionally formed in the pharyngeal region. A specimen of a smooth oval exostosis growing from the pharyngeal vertebræ is preserved in the museum of Guy's Hospital.[2] The author has recently seen a case of this kind.

A specimen of enchondroma which projected into the cranium, the orbits, the antra, the nasal, zygomatic, and pterygo-maxillary fossæ, is contained in the museum of St. George's Hospital.[1]

---

[1] *Deutsche Klinik*, 1861, p. 61.

[2] *St. George's Hospital Reports.* Vol. ii. 1867, p. 152.

I have met one case of ordinary papilloma growing from the mucous membrane on the posterior wall of the pharynx.

PHARYNGOCELE.

A diverticulum or sac is sometimes formed in the pharynx, and still more rarely in the œsophagus. It is occasionally congenital, but is more frequently the result of external injury sustained in swallowing foreign substances. Sometimes it is produced by the repeated catching of food in the excavation of an ulcer, the walls of which become eventually converted into a sac. In other cases it seems to have been formed by the mere habitual retention of food, which gradually distends the tissues and forms the sac; these cases occurring principally in the persons of hysterical females.

The symptoms of this affection are those of some mechanical impediment to effectual deglutition, accompanied very often with the regurgitation of food. When the sac is empty its existence can be detected by exploration with the sound; when filled with food it presents the appearances of a tumor in this region, and can often be felt from the outside.

The size of the tumor varies. In the famous case of Ludwig Kühne of Neustadt,[2] the tumor had attained the size of a man's fist, producing death after nine years' suffering, among other things, from rumination.

The thinness of the muscular walls of the pharynx in this situation is supposed to favor the formation of these sacs, by the protrusion of the mucous membrane.

The treatment for this affection, when high enough up to be reached, would seem to consist in excision of the sac. It has been recommended to cauterize the interior of the sac, and to feed the patient by means of the stomach-tube, so as to prevent any retention of food in the sac.

---

[1] *St. George's Hospital Reports.* Vol. ii. 1867, p. 152.

[2] Albers. *Path. Anat.* 1839, p. 272.

NASO-PHARYNGEAL TUMORS.

Naso-Pharyngeal Polyps.—This name is given in a general manner to tumors of various characters which make their appearance in the superior or nasal portion of the pharynx—that is, the portion above the position of the palate. In many instances these tumors have no more connection with the nasal organ or its accessories than if they occurred in the lower portion of the pharynx. Nor is every growth in this region by any means a polyp. Cancerous, fibrous, enchondromatous and osseous tumors are also developed in this locality.

Inasmuch, however, as custom has applied the term naso-pharyngeal polyp to all tumors in the upper part of the pharynx, it will be necessary to consider them under the same head.

The true polyp is sometimes fibrous and sometimes glandular, apparently originating in an obstructed follicle, which has become gradually converted into a sac containing the accumulated products of secretion in a more or less altered state. The fibrous polyp is usually of a reddish or purplish color, and arises from the upper cervical vertebræ at the posterior wall of the pharynx, or from the base of the skull, usually to one side or the other, rarely, if ever, in the median line.[1] It may also arise from the cartilaginous portion of the Eustachian tube. A tumor in this region may take a partial origin from some portion of the posterior circumference of the nares, and under these circumstances constitute a naso-pharyngeal polyp in reality. These tumors are usually slow in growth, and exhibit a great tendency to extend prolongations into the sinuses of the nose and face, and the cavity of the mouth, thereby eventually producing a characteristic deformity of the countenance, sometimes denominated frog-face, which augments with the increasing growth and encroachment of the polyp.

These tumors appear at all ages, but most frequently in middle life; but they have been seen in the fœtus. They are not recognized, as a rule, in their early stages, but only when the patient applies for relief from frequent epistaxis, increasing or permanent obstruction in nasal respiration, chronic discharge from the nostrils, or those symptoms of deficient articulation, impaired deglutition, or impeded respiration, which have been elsewhere referred to.

---

[1] **This point is being investigated by Prof. H. Allen, of Philadelphia, who first drew my attention to the circumstance.**

Inspection with and without the use of the rhinoscope, palpation by the finger, and explorations with the probe through the nostrils, establish the diagnosis.

The removal of tumors from the nasal portion of the pharynx is a matter of great difficulty, chiefly on account of the inaccessibility of their points of attachment to operative procedure through the mouth and through the nostrils, but also on account of the amount of attendant hemorrhage, and the difficulty in restraining it. It is good practice to accustom all the parts which will be subjected to manipulation to a preliminary contact with instruments, with the finger passed behind the palate, and so on, so as to secure a better tolerance during the operation.

Where the tumors have been favorably situated, they have been seized by curved forceps passed behind the palate, or through the nostrils, and forcibly torn from their beds. This is by no means a safe operation, although it has often been successful. Cases are on record of death from hemorrhage during the operation, and also from secondary hemorrhage after the operation. In addition to this, these tumors occasionally extend into the cranium, and thus endanger cerebral hemorrhage and other complications when roughly torn away.

A case of this kind has been recently reported to the Clinical Society of London, by Mr. Cooper Forster.[1] "The patient was nineteen years of age, and had a large growth, filling up the left nostril, firm, fleshy, and fibrous, and covered with mucous membrane. The right nostril was not much interfered with; there was no swelling of the face or fulness of the palate, nor any projection in the throat. Chloroform was given, and a wire snare was put round the growth, which broke off, and caused it to bleed profusely. Mr. Forster then made another examination, and, having passed his finger up the nostril, found an enormous growth which could not be circumscribed, but large portions of which he tore away with forceps. Four days after the operation, the patient suddenly became unconscious. The right half of his face was numb, and, though he rallied, he was never able to speak except to say "too-too." The temperature rose to 102° F. He had three convulsive fits on the seventh day, and became totally unconscious; and died twelve days after the operation. The post-mortem examination showed general arachnitis, and sloughing of the brain about Broca's convolution. That portion of the growth which had not been removed occupied the left side of the external base of the skull, and filled the base between the greater and lesser wings of the sphenoid, the orbital plate of the frontal, and the cribriform plate of the ethmoid bone. It had extended from the nasal fossa by way of the sphenoidal fissure into the back of the orbit, but without damaging the optic nerve. The cribriform plate of the ethmoid was broken; and at the back part there was a small opening about a quarter of an inch in diameter, and a fracture extending forward from the opening. Microscopic examination showed the growth to consist of small fusiform cells and stellate connective tissue."

---

[1] *Lancet*, May 20, 1871; *Medical Times and Gazette*, May 27, 1871; *The Medical Times*, August 15, 1871.

The cutting away of accessible portions by curved knives and scissors, used through mouth or nostril, is still more apt to be attended by severe hemorrhage, primary or secondary, though not likely to injure the cerebral structures in the unfortunate cases in which they are involved.

The passage of a ligature around the base of the tumor by means of a thread passed through the canule of Bellocq, and the subsequent excision of the growth, after securing the ligature, is attended with less risk; but even an operation of this kind has been followed by death.

Another operation, which has been extensively practised, consists in ligating the tumor, so as to destroy its vitality, and tightening the ligature at intervals, so that the tumor shall slough off, which it will do in a period varying from four or five days to a fortnight or more. The stench which arises during this process is said to be unbearable to patient as well as to attendants. To prevent suffocation by the falling of the polyp upon the larynx, Graefe, in whose practice an accident of this kind occurred, has recommended the passage through the body of the polyp of a thread which is secured outside of the mouth, and by means of which the extraction of the tumor is facilitated. But, even with this precaution, death by suffocation has occurred from impaction of the polyp in the pharynx, or upon the larynx, after it has become detached. It is therefore highly important that a competent and well-instructed assistant should be constantly at the side of the patient, after an operation of this kind, until the mass has come away, that he may not be choked to death with it in his sleep.

The pain attending this operation is said to be very great, and often causes swelling of the throat and of the face; in addition to which, œdema of pharynx and larynx may ensue, necessitating tracheotomy.

The polyp itself, too, sometimes increases in size, necessitating the use of incisions to give vent to some of its contents.

It would appear good practice always to make incisions in the tumor after an operation of this kind, in order, in the first place, to reduce its size, by loss of blood from its substance, and, in addition, to provide a vent in advance for the products of decomposition as they accumulate.

It is only in cases where there is more or less of a pedicle to the tumor, that the operation of ligature is likely to be successful. In tumors with broad attachments, especially if there are prolongations into the adjoining cavities, operations of a much more serious nature are necessary for the complete removal of the growth.

In some instances the soft palate has been divided in order to afford access to the growth. This operation dates from the beginning of the last century, and has been frequently performed in our own time.

Sometimes the entire palate and uvula is slit, but, where possible, the palate alone is to be divided. By this means the tumor can be more readily seized with forceps and excised, and the hemorrhage better controlled. The usual plan has been, where the hemorrhage was excessive, to employ the hot iron. Circumstances determine the propriety of uniting the wound in the palate by suture at the time of operation, or deferring union to a subsequent period by the method of staphylorraphy, in order, as recommended by Nélaton, to be able to apply caustics to the stump, or parts from which the tumor has been removed.

In some instances the palate has been divided merely to afford the opportunity of ligating the polyp; in others, in order to admit of its extraction by the forceps. These cases occurred chiefly in children, whose parts were too small to admit of the finger behind the palate without danger of suffocation.

Prof. Nélaton has not only divided the palate, but has dissected the mucous membrane off from the hard palate, a piece of which has then been cut out in order to gain access to a tumor growing from the base of the skull, and to enable him to scrape away the periosteum from the base, and thus the better prevent a recurrence. In an operation of this kind, it would be well to remove the periosteum from the hard palate in connection with the mucous membrane, in the expectation, after reunion, of a reproduction of bone, the same as takes place after Langenbeck's operation of uranoplasty for cleft of the hard palate.

Prof. Nélaton has also removed the entire palate in cases where its structure was involved in that of the tumor.

A still more serious operation is sometimes requisite to accomplish the extirpation of these troublesome tumors. This consists in the partial or complete removal of the upper maxillary bone, as may be necessary on account of the size and situation of the growth. Access to the tumor is made from the exterior by the incisions usually practised by surgeons for partial or complete removal of the upper jaw, or for its resection in cases of growths involving the antrum. In some cases it is possible, as in a case operated upon by Larghi,[1] to reach the growth by means of an anterior opening through the superior maxillary bone, executed behind the everted upper lip.

---

[1] *Gaz. Méd.*, Paris, 1867, p. 617.

The operation by removal of the upper maxillary bone has terminated fortunately in a number of instances; but it is often attended with a great deal of danger, not merely from the removal of the bone, itself a serious procedure, but because the nature of the growth necessitating an operation of this kind is apt to be one to present unfortunate complications.

In illustration of this point, I translate in detail from the *Gazette des Hôpitaux*, Aug. 9th, 1870, *et seq.*, the following record:—

"*Naso-pharyngeal Polyp of Multiple Attachments and Rapid Growth.—Ablation of the Superior Maxilla.—Evulsion of the Polyp.—Extensive Hemorrhage; Syncope.—Entrance of Blood into the Air-passages.—Immediate Death.*"

"Bachelet, æt. 16, hôpital Lariboisière, Salle Saint Louis. Good constitution, marked embonpoint, color fresh and rosy. No trace of anæmia. Health excellent. Several cervical ganglia a little large, dating from infancy.

"Apparent onset of the disease last October, by a little difficulty of respiration, with occlusion of the left nasal fossa, and a series of epistaxes which ceased spontaneously during December. Towards this period the cheek began to swell, and hearing gradually disappeared on the left side.

"*Condition on entering hospital, June 14th.*—A tumor upon the left cheek the size of a turkey-hen's egg, rather firm, slightly movable, indolent to the touch, non-adherent to the skin, and without change of color except some venosities. Slight swelling at the inferior portion of the temporal fossa. Occlusion of left nasal fossa by a tumor visible a short distance within the nostril. Depression of the soft palate by a tumor in the pharynx readily recognized by the touch, but without the ability to ascertain its pedicle. Commencing exophthalmia of left side.

"Noisy respiration, occurring only by the mouth; complete deafness of left side. Deglutition easy. No pains. Vision intact. Sensibility of integument conserved throughout. Cerebral functions normal.

"The diagnosis was easily made. There was a very voluminous naso-pharyngeal polyp of the left side of the base of the skull, filling the pharynx and sending prolongations into the nasal fossa, the maxillary sinus, the orbit, the pterygo-maxillary notch, and possibly the temporal fossa.

"A preliminary resection of the upper maxilla appeared indispensable, and as no contra-indication was presented, the patient was subjected to the usual preparations, and on June 29th the operation was performed in the following manner:—

"The patient being chloroformed, not without difficulty, M. Verneuil, with a view of avoiding the accumulation of blood in the mouth, made two incisions in the cheek, one vertical, the other oblique externally, without wounding the mucous membrane. He could thus cut the two osseous pillars, molar and nasal, by means of the cutting-pliers of Liston, without the passage of a drop of blood into the mouth.

"Dissection of the malar fragment, extraction of the canine tooth, division of the intermaxillary suture, and extraction by traction of the maxillary bascule, were all performed rapidly and without hemorrhage into the mouth. The polyp, when isolated, was found surrounded by a venous network extremely developed, which jetted out blood in abundance. The pedicle of this was without exaggeration three centimetres in diameter, and was inserted deeply against the vault of the pharynx in such manner that it was impossible to grasp it. Before reaching it, M. Verneuil attacked the polyp, which he broke up in removing it lobe by lobe. As the blood flowed in streams, it was sopped up with compressed sponge. He was finally able to apply a pair of forceps upon the large pharyngeal pedicle of the tumor, but this did not prevent the blood from flowing in great quantity. The patient, who became stifled, cried and ejected blood continually; was raised, and cold water was projected into the mouth from an irrigator in an attempt to arrest the hemorrhage. Fearing to provoke syncope, he was laid down again immediately after. He was hardly laid down when syncope occurred; upon which M. Verneuil introduced into the larynx an adult silver canula to insufflate the air and suck out the blood. He was able in this way to fill his mouth several times with blood, and to disembarrass the bronchial tract in part of this fluid, while at the same time his assistants pressed alternatively upon the belly. At a given moment the pulsations of the heart became appreciable as well as the pulse at the wrist; the patient respired and began to cry, which again gave rise to hemorrhage, momentarily arrested by the syncope. The same manœuvres were recommenced, the blood was sucked out, the air insufflated, the head was lowered, but efforts were vain; the patient did not revive, but succumbed in spite of efforts at resuscitation, prolonged for more than half an hour."

This account was read at the Société Impériale de Chirurgie, at their meeting on June 29, 1870, and was followed by a discussion as to the cause of death—whether syncope or asphyxia; death being generally ascribed to asphyxia.

At the meeting of July 6, 1870, M. Verneuil presented the naso-pharyngeal polyp of which he had spoken at the last meeting, and gave the following details of the autopsy.

"A complete autopsy could not be made, consequently we were unable to assure ourselves of the presence of blood in the air-passages; but in examining at leisure the region operated, we have secured important details relative to the implantation of the tumor.

"It had, without doubt, originated on the left side, but it had progressively extended over a very large surface. It had adhered, first, to the entire pharyngeal face of the basilary apophysis; second, to the entire inferior face of the body of the sphenoid; the sphenoidal sinus, largely open and strongly dilated, enclosed a lobe of the tumor of the volume of a large nut and without adherence; third, to the right lateral face of the vomer, to the extent of about one centimètre; fourth, to the point of the petrous portion of the temporal bone upon a surface as large as a finger-nail; fifth, to the base of the pterygoid apophysis, which had almost entirely disappeared, and was only represented by osseous débris mingled with fibrous tissue; upon an osseous floating lamella the external insertion of the pterygoidien was distinctly recognized.

"Below, at the side of the pharynx, the insertion of the polyp was distinctly limited to the neighborhood of the anterior portion of the occipital foramen. No adhesion to the occipito-atloid ligament or to the bodies of the vertebræ. The mucous membrane of the vertebral wall of the pharynx was absolutely healthy.

"The left nostril was very much enlarged by the displacement of the septum, which had become applied exactly against the external wall of the right nasal fossa; this last was completely obliterated. Some osseous débris still represented the septum, which separated the left nasal fossa from the maxillary sinus of the same side. The nasal and maxillary lobes of the tumor were distinct. The anterior and inferior border of the orbit had been implicated during the operation, but the rest of the floor of the orbit had been destroyed, by compression doubtless, in such manner that, behind and below, the orbital cavity communicated extensively with the wound.

"Finally, and this is perhaps the most important point of this anatomical exploration, there was observed in the neighborhood of the foramen, torn anteriorly, a large perforation of the base of the cranium, capable of admitting the terminal phalanx of the thumb, and permitting the penetration of a lobe of the tumor which had raised the dura mater, without having at all contracted any adherence with it. It would have been important to open the cranium, to learn if the brain or its membranes in this vicinity had suffered from intrusion of the tumor. No trace of inflammation existed on the inferior face of the cranial periosteum.

"It had been believed that the extirpation of the polyp had been complete, but this had not been the case. There had been left behind a voluminous lobe, which, departing from the base of the pterygoid apophysis, proceeded directly outwards, filled up the lateral wall of the pharynx, then insinuated itself between the posterior border of the ascending branch of the maxilla and the anterior border of the sterno-mastoid, and reached finally by its free extremity to the summit of the mastoid apophysis and the deep surface of the integument. This lobe might be called the superior cervical; it was enveloped throughout by loose conjunctive tissue; its enucleation was easy. Towards its anterior face was attached a small fibrous tissue of the size of an almond, almost entirely free, or at least without connection with the bones. The reporter did not know whether the existence of free lobes had yet been noted in cases of naso-pharyngeal fibromes. There is still to note a final particularity not less interesting. It is generally admitted, and with reason, that the tumors in question originate from the periosteum, and leave the subjacent osseous structures intact, in such manner, that if the extraction is complete, these surfaces are denuded, but uninjured.

"M. Verneuil has been able, in another observation, to assure himself of the reality of this fact, but such was not the case here. It has already been said that the base of the pterygoid apophysis had disappeared, not by absorption, but by a sort of interstitial invasion of the osseous tissue by the fibrous tissue. An analogous disposition was encountered at the basilary apophysis. After having successively extirpated the nasal, buccal, and maxillary lobes, he had seized the pharyngeal lobe to its root with strong forceps, and had torn it off completely—in appearance at least. However, the surface of implantation at the basilary apophysis remained unequal and nodular; the touch gave the sensation of a spongy surface, studded with osseous débris. At the autopsy he recognized, in fact, at this point, a substance composed of fragments of spongy tissue, of layers of fibrous tissue, and of several small rounded fibrous tumors, regular, of the volume of a grain of wheat or a pea. In enucleating this substance with a blunt instrument, he found that it occupied the very centre of the basilary apophysis, which was excavated and reduced, on the side of the cranial cavity, to a very thin layer of osseous tissue. In pressing feebly with the blunt instrument against this layer, he readily penetrated to the dura mater.

"If, then, to destroy the roots of the tumor at this point, he had rasped, or applied the actual cautery, he would have perforated the thin osseous barrier. If he had abstained, the intimate combination of the fibrous tissue with the osseous tissue, and the persistence at this point of the small circumscribed fibrous lobes, would almost inevitably have been the origin of a reproduction.

"Regarding the structure of the morbid production, it was altogether similar to that of these fibromes, that is to say, formed of fibrous tissue, conjunctive elements in every degree of evolution, and an incredible quantity of vessels, some of which had attained the calibre of 2 millimètres.

"The preceding observations are of a nature to extenuate some little the regrets inspired by this fatal operation. If death had not occurred suddenly, it would have been the almost inevitable consequence of cranial perforation and of consecutive meningo-encephalitis."

In the discussion which followed, M. Forget "recalled an analogous case presented by him to the Society a dozen years previous, concerning a naso-pharyngeal polyp in a young boy incompletely operated upon through the nasal passages by M. Huguier. At the autopsy which followed close upon the operation, there was discovered the existence of multiple tumors in the thickness of the bone at the base of the cranium, and as far as beneath the dura mater. One, among others, filled the sphenoidal sinus, and appeared as if pediculated upon the sella tursica. The multiplicity of origin and the plurality of points of insertion of these neoplasms, the solidarity which exists between them and the osseous tissue of the base of the cranium, their very great vascularity, indicate sufficiently that they are something else than true polyps, and that they are an affection of a separate lesion of the spongy tissue of the base of the cranium, peculiar to young subjects and those in whom the bones are growing.... In the service of Boyer, Roux wanted to operate contrary to the opinion of the master. There was grave hemorrhage, necessitating the tampon, and the young man was carried to his bed incompletely disembarrassed of his supposed polyp.

"The same thing occurred to Lisfranc, who abandoned the completion of the operation; and the little patient, rendered exsanguine, succumbed at the end of a few days.

"Adding these two facts to eight others which our colleague has been able to collect in the various records, *eleven* in all, it is questionable if it is not better, with Boyer, to interdict all attempts at extraction in such cases."

Prof. B. Langenbeck, of Berlin, has proposed and put into practice a method of reaching the growth, which consists in the resection of the nasal process of the upper maxillary bone and the nasal bone. This operation has been performed with more or less variation by other surgeons, and in suitable cases with successful results. It partakes of the objection to many other operations, that in too many instances it does not permit free access to the parts, so that the extirpation is sometimes incomplete.

In other instances the nose has been turned down, and the growth removed successfully by various appliances. This mode of access has recently been resorted to successfully in this country by Dr. Cabot.[1]

Dr. Achille Bonnes[2] succeeded in the ablation of one of these polyps by means of a metallic nail attached to a thimble.

Dr. E. Cutter,[3] of Boston, has devised a very ingenious adaptation of the wire-loop to the mechanism of an écraseur, by which an instrument small enough for use through the nostrils, or behind the palate, can be readily employed in favorable cases; and with which he has operated successfully and satisfactorily.

The use of the galvano-cautery has been resorted to for the removal of these polyps; and where an apparatus is at hand, it is no doubt better than the ligature or the knife, whether employed through the mouth or the nose, or after access to the parts has been obtained by means of some one or other of the surgical operations which have been mentioned. The cautery sears the vessels as it cuts its way through the structures, and thus greatly lessens the danger from hemorrhage. This method, first proposed and executed by Prof. Middeldorpf, has been employed with success by Nélaton, Dieffenbach, Voltolini, Semeleder, Neumann, von Bruns, Brenner and others.

Electrolysis, too, has been resorted to successfully for the removal of these tumors, by disintegration and absorption.

Prof. Nélaton has reported several cases treated by electrolysis. One was completely cured, two were very nearly cured, one returned, and in one case death ensued from typhoid fever during the diminution of the tumor. Fischer reports a case entirely cured within two months, after six applications of the electric current. Prof. von Bruns[1] reports a case of success in a man, 23 years of age, with a large fibrous tumor of the pharynx, who had been operated upon three years previously, after splitting the soft palate, by the constrictor of Maisonneuve. A recurrence had taken place, and the growth not only filled the entire pharynx, so that it not only projected into the mouth through the artificial cleft, reaching as far as the lower border of the palate, but sent a prolongation through the left nostril to its very external opening, and had pushed the left eyeball outwards, downwards, and forwards to the distance of several lines. One needle from the battery was passed into the pharyngeal portion of the polyp, and another into the nasal portion. From May, 1869, until March, 1870, 130 such applications were made, and the polyp had become so far destroyed and contracted that it could no longer be seen from the mouth or from the nose, though its remains could be felt by the finger from the mouth and from the nostril, in the latter instance only by burying the finger within the nostril to a depth of two inches. The improvement began with the institution of the electrolytic treatment.

---

[1] *Boston Med. and Surg. Jour.*, Feb. 9th, 1871, p. 95.

[2] *Bull. Gén. de Thérap.*, Oct. 30th, 1869, p. 364.

[3] *Boston Med. and Surg. Jour.*, Nov. 24th, 1870, p. 339, illustrated.

Although the naso-pharyngeal polyp is such a serious affection that its removal may be accompanied by death, or be followed by a fatal result from hemorrhage, asphyxia, surgical fever, or pyæmia, it must not be forgotten that cases sometimes undergo spontaneous cures.

Dr. Kömm[2] narrates the case of a man of 28 years of age, who had suffered for a long time from a polyp which pressed the palate strongly forwards into the mouth. It filled the entire posterior portion of the pharynx, and was so intimately connected with the surrounding tissues that ligation was not available. An attempt was made to excise it, but the patient would not suffer the completion of the operation. The patient was placed in a state of rest as to mind and body; ice was applied upon the head and around the throat; and nutrition maintained by enemata. The polyp underwent spontaneous absorption.

---

[1] *Die Galvano-Chirurgie*, Tübingen, 1870, p. 85.

[2] Schmidt's *Jahrb.* XXX. p. 61.

Occasionally, too, spontaneous sloughing of these tumors occurs. In a case under the care of Mr. H. C. Johnson,[1] recurrence took place after the original tumor had been extracted by curved forceps passed round the palate. While the propriety of dividing the palate, so as to gain access to the base of the growth, was under discussion, rapid sloughing took place spontaneously, and removed every trace of the tumor.

In a case under the care of Mr. Birkett,[2] the hemorrhage from the polyp was so great as to necessitate ligation of the common carotid artery. The whole tumor sloughed away through a sinus which formed in the cheek, and seven years afterwards the patient was reported as perfectly well, with no evidence of the tumor, and with the sinus in the cheek healed.

WOUNDS OF THE PHARYNX.

Accidental wounds of the pharynx sometimes occur, and present some difficulty in their management on account of the embarrassment in supplying nourishment. Food and medicine should be administered by the rectum as far as possible, on account of the danger of the passage of food, when swallowed, into the cellular tissue of the neck. In most cases, however, the patient will manifest but little desire to swallow, on account of the pain attending the act of deglutition.

Occasionally wounds of the pharynx give rise to the formation of an abscess beneath the mucous membrane. Prompt evacuation of the contents of the abscess is called for. A case of this kind came under the author's care a few years ago, in which the accident was produced by a stick of wood in the mouth, the patient falling prone and striking upon the stick. It is quite likely that a splinter was broken off in the pharynx, but as the stick had not been preserved, this point could not be determined.

Wounds of the pharynx, communicating externally, are sometimes met with as the result of attempts at suicide. In these instances the wound in the throat is made above the hyoid bone or below it. In the former instance the root of the tongue is wounded; in the latter, the epiglottis is often implicated, and it has sometimes even been pushed down into the larynx, or been drawn into it during treatment,—in either case producing suffocation. It is therefore recommended to remove any fragment of the epiglottis that is already nearly divided. After hemorrhage is arrested, the parts are brought together by suture, room being left for the discharge of sputa and the inflammatory products which will present at the wound. Swallowing being difficult or impracticable, nourishment is maintained by the use of the stomach tube, or by allowing liquid aliment to trickle down into the œsophagus, as it were. If this be impracticable, the nourishment should be administered by enema. Medicine may be administered hypodermically or by enema.

---

[1] *Brit. Med. Jour.*, Jan. 1858, p. 61. *Guy's Hosp'l Rep.* 1867, p. 157.

[2] *Brit. Med. Jour.* 1868, p. 119. *Guy's Hosp'l Rep.* 1867, p. 167.

In the treatment of wounds of the pharynx Prof. Gross recommends that the suture of the pharyngeal wound itself be cut off close to the knot, so that the loops may fall into its cavity and thus descend into the stomach.

The pharynx is occasionally wounded during the performance of a surgical operation. A singular chirurgical wound of the vault of the pharynx is recorded as having occurred under the following unusual circumstances. In a case of obstinate suborbital neuralgia, Prof. Linhart, of Wurzburg, after the failure of many efforts at relief, including section of the affected nerve, determined to cut off the inferior maxillary nerve behind the malar branch, as well as the posterior dental nerves, to prevent recurrence in those branches. In order to avoid the disfigurement left by the method of Dr. Carnochan, of New York, he made an incision which enabled him to raise the lower eyelid, and divide the tarso-orbital membrane in scraping the border of the orbit. The myrtiform pavilion of a canulated sound was passed between the lower floor of the orbit and the globe of the eye, as far as the summit of the orbit. The eye being held up, the curved extremity of the galvano-caustic apparatus of Middeldorpff, used in the cauterization of strictures, was introduced to the most internal angle of the suborbital fissure, and applied firmly from before backward; the current was passed, and the point occupied by the cautery was instantaneously destroyed, when the instrument penetrated from before backward without any resistance. On sounding the wound it was found it had penetrated to the bones at the base of the skull. The current was again passed, and the beak of the instrument was turned inwards and glided along the base of the skull. The cautery penetrated to the cephalic portion of the pharynx, immediately behind the posterior orifice of the nasal fossa, and after the operation air issued by the orbit when the patient used the handkerchief and when he coughed. The operation was tedious and bloody, but successful.[1]

---

[1] (*Vierteljahrsschrift für die praktische Heilkunde*, t. 11, 1860.) *Arch. Gén. de Méd.*, Nov., 1860.

CHAPTER XI.

SPECIAL AFFECTIONS OF THE ŒSOPHAGUS.

ŒSOPHAGITIS.

INFLAMMATION of the œsophagus is of rare occurrence. It is sometimes produced by mechanical injury from the passage of a foreign body, or of a surgical instrument, and occasionally by the swallowing of hot and acrid fluids. Chronic inflammation of the œsophagus, followed by abscess and ulceration, sometimes results during the course of caries of the spine, and in cases of tumors connected with the œsophagus or pressing upon it. Inflammation of the œsophagus would be treated on general antiphlogistic principles, with the use of only bland and mucilaginous articles of diet, or the administration of nutriment by the rectum.

CONGENITAL OCCLUSION OF THE ŒSOPHAGUS.

Congenital occlusion of the œsophagus is sometimes met with, and it is one of those malformations irremediable by surgery. The existence of this condition may be suspected when the child takes the breast readily, but is unable to swallow the nutriment and rejects it by the mouth. If, as often happens, there be a communication with the trachea, the attempt to swallow will be followed by symptoms of suffocation, the result of the presence of food in the air-passage. On inspection, the mouth and fauces appear normal. On attempting to pass a bougie along the œsophagus its progress will become arrested in a sort of cul de sac. The occlusion is usually found in the upper portion of the œsophagus.

A number of cases of this malformation have been recorded. Holmes, in his treatise on the Surgical Affections of Childhood, mentions three which are reported in the *Pathological Transactions* (vol. iii., p. 91), (vol. vii., p. 52), (vol. viii., p. 173). The obliteration in the first case commenced about an inch below the commencement of the œsophagus, and continued to a point just above the origin of the bronchi. Swallowing had produced choking, which induced the diagnosis of a communication with the trachea; and an opening of this kind was discovered after death. The child was nourished by enemata, and died on the eleventh day.

In the second case, the upper and lower portions of the œsophagus were in direct communication with the trachea, which was thus, as it were, doing additional duty as part of the gullet. Dr. Ogle, who reports the case, believed that some of the milk taken by the child may have reached the stomach. The child perished on the fourth day.

In the third case there coexisted malformation of the heart and great vessels, with cyanosis. The trachea communicated with the lower part of the œsophagus, and, Mr. Holmes thinks, must have communicated with the upper part also, inasmuch as attempts at swallowing always produced dyspnœa. The obliteration extended from the end of the pharynx to a point opposite the bifurcation of the trachea. The child died on the twelfth day.

From the result of the examinations made in the instances recorded, Mr. Holmes justly concludes that surgery offers very little hope of remedying or overcoming such a condition by any operative procedure. In cases where a tracheal fistula exists, in connection with obliteration of the œsophagus, he questions whether life would be permanently maintained, even if the passage of food could be restored, and he does not think the attempt should be made in any such case. Where no such communication exists, he sees no objection to the operation being attempted, after due explanation to the parents of the fatal nature of the case. The object would be to cut down upon the point of a catheter passed along the pharynx, and then to attempt to trace the obliterated œsophagus down the front of the spine, until its lower dilated portion is found. A gum-catheter would then be passed through an opening made in the upper portion, and so on into the stomach through the lower portion. If the two portions are near enough to be connected by silver sutures over the catheter, and if the latter can be retained until they have united, Mr. Holmes thinks that permanent success might possibly be obtained.

Mr. Ryland[1] refers to a case related by Dr. Houston,[2] and which occurred under his own observation, where the œsophagus communicated with the posterior part of the trachea by a large opening. The pharynx was unusually wide, and terminated some way down the neck in a cul de sac, without having any connection with the œsophagus. The larynx and its muscles were all perfect. This infant lived about twenty-four hours. On every attempt to suck, fits of coughing immediately supervened, threatening suffocation by their violence, and lasting till the milk was all disgorged again. The only way in which food could get into the stomach was by passing through the rima glottidis first, and then reaching the œsophagus from the opening in the posterior part of the trachea.

Mr. Annandale[3] illustrates the pathological appearances of the case of an infant who died in forty-eight hours after birth, in which the upper part of the œsophagus was dilated into a pouch three-tenths of an inch above the bifurcation of the trachea, into the posterior wall of which it entered at this point. Similar cases reported by others are referred to in his article.

CONGENITAL FISTULE OF THE ŒSOPHAGUS.

As has been mentioned elsewhere, a fistule of the œsophagus sometimes remains after a wound of that tube, or after the discharge of an œsophageal abscess, the result of the retention of a foreign body.

A few cases of congenital fistule are on record. The evidences of a fistulous opening are seen on some part of the neck, giving discharge every day to several drops of pus, a drop or two of which can almost always be pressed out of the little opening. The track of the fistule is often so slender that a delicate probe cannot be passed along it without penetrating the walls of the fistule. The fistule is supposed not to be connected with the air-passages, in consequence of the failure of every attempt to pass air out of it from the lungs.

---

[1] A Treatise on the Diseases and Injuries of the Larynx and Trachea.

[2] *Dublin Hospital Reports*, Vol. V., p. 310.

[3] *Edinb. Med. Jour.*, Jan., 1869, p. 598.

If the opening have been congenital, it will probably be found on inquiry, as in a case reported by Dr. J. M. Duncan,[1] that drops of milk exuded from it at some time when the child was suckling.

The position of the fistulous opening, the direction taken by an exploring probe, and some history of the escape of nutriment, can alone distinguish it from other fistules of the neck which open externally in front of the thyroid cartilage, or to one side of it, and which originate in one of the three mucous bursæ in this situation, most frequently, according to the researches of Gürlt, in the infra-hyoid bursa.

I have seen a few cases of fistulous openings in the neck, either congenital, or of life-long standing to the best recollections of the patient, in which it was impossible even, in one case, by cutting down upon the track and following its apparent entire course, to find whether it really communicated with the pharynx or œsophagus, or not. In the case referred to no cyst was found connected with the thyro-hyoid bursa, though the track led directly to the hyoid bone, which appeared denuded of its periosteum. This was scraped, the fistulous track cut out, and the parts brought together, with some benefit as far as a reduction of the amount of discharge was concerned, but failure in reference to any obliteration of the fistule, which was congenital, and existed in a healthy lad some twenty years of age.

STRICTURE OF THE ŒSOPHAGUS.

Stricture of the œsophagus is occasionally congenital, and, under the circumstances, would be naturally considered as necessarily fatal. That this is not so, is attested by a case narrated by Dr. Wilks[2] and referred to by Mr. Holmes,[3] in the following language:—

---

[1] *Edin. Med. Jour.*, Nov., 1855.

[2] Pathological Transactions, XVII., 138.

[3] The Surgical Treatment of the Diseases of Infancy and Childhood., 2d Edit., p. 137.

"The patient was a very healthy man, and well nourished. He died at the age of seventy-four, of pneumonia, having never previously had a serious illness during the whole of Dr. Roote's professional knowledge of him, which extended over upwards of thirty years. He took his food, however, like a ruminating animal, and had never been free from this ruminating tendency, as far as he could remember, so that it was believed to be congenital, especially as post-mortem examination showed no trace of any diseased action. He always brought up a portion of every meal he took, and could not swallow solid food without washing down each mouthful with fluid. At the same time, he always persisted in saying that he did not vomit his food, but coughed it up, and that he had never been sick in his life. A bougie could be passed, but it was always followed by his coughing up more or less of the solid or liquid food taken within the last few hours. On examination, the upper part of the œsophagus was found enormously dilated, measuring six and a half inches in circumference in its undistended state, and was of nearly uniform size throughout. Towards the stomach, however, it suddenly contracted, and here the tube was as much below the natural size as in other parts it was above it. The little finger could just be squeezed through into the stomach. But there was no thickening, and no trace of cicatrization as the result of disease."

A similar condition of things is sometimes attendant upon simple stricture of the œsophagus, the result of the inflammatory process, without the production of pseudoplastic deposit. The inflammation giving rise to this condition may have implicated only the submucous connective tissue, or it may have affected all the coats of the œsophagus.

Sometimes the immediate cause of the stricture is unknown, and it is therefore referred to a spontaneous origin. Most frequently the stricture results from the inflammation following mechanical injury, or scalds received in swallowing hot fluids or caustic substances. The most common seat of this form of stricture is at the upper part of the œsophagus, the narrowest portion of the tube in its normal condition, or it may exist at the lowest portion of the pharynx, just behind the cricoid cartilage.

These are the portions most accessible to mechanical injury, burns, and scalds. Occasionally the stricture is the result of acute or chronic inflammation, of spontaneous origin. It is also produced by the existence of malignant disease.

The stricture is usually due to disease involving the mucous membrane and submucous connective tissue, though sometimes involving the muscular portion of the tube also. In cases which are not cancerous, the diminution of the calibre of the tube is usually due to submucous fibrinous deposit, and to thickening of the mucous membrane. This diminution may be so great as to amount to almost complete occlusion. The seat of the stricture is usually just behind the lower portion of the larynx, or just below it; but it may occur lower down, and has been known to take place within three or four inches of the cardiac orifice of the stomach. Most frequently the stricture is single, but sometimes there are two or three of them. In a case recently under the author's care, there were two strictures, one just behind the lower portion of the larynx, which could be readily passed with a moderately large bougie, and another, apparently two inches below it, which could be passed only by means of a rat-tailed bougie. Most of the cases met with occur in early adult life, but they may be encountered at any age. Males appear to suffer more frequently than females.

The diagnosis of stricture of the œsophagus is usually sufficiently easy. The patient will complain of more or less difficulty of deglutition, which in severe cases may amount to inability to swallow; or rather of an impediment or obstacle to the completion of the act of deglutition. This is sometimes attended by spasm, regurgitation of food, oppression in the respiratory organs, pain in the parts, and more or less nervous distress. There will be more or less general ill-health from insufficient nourishment; and sometimes pain, more or less severe, will be complained of in the region of the sternum, stomach, or cervical vertebræ. It has been proposed by Dr. Hamburger[1] to apply auscultation of the œsophagus to the diagnosis of this and other diseases of the tube. The fact being determined that the impaired deglutition is not due to paralysis, to abscess of the pharynx or œsophagus, or to tumor, the suspicion of stricture arises; and the diagnosis is confirmed or disproved by the passage into the stomach of gum-elastic bougies, or œsophageal probes, consisting of olive-shaped masses of ivory of different sizes, and affixed to stout whalebone rods. These instruments are to be carried through the stricture if possible, and the length of the constriction is judged of by the distance along which resistance to the passage of the instrument is felt; the diameter of the stricture, by the size of the largest instrument which can be employed; and its consistence, by the amount of resistance offered to the passage of the exploring instrument. The instrument, after passing a stricture, should always be carried down into the stomach, in order to ascertain whether there be any more strictures further down the œsophagus. Great care is necessary in the passage of these instruments, on account of the probable existence of a pouched condition of the tube immediately above the seat of stricture, into which the instrument may glide, and through which it may be thrust by the employment of an undue amount of muscular force.

---

[1] *Medizin. Jahrb.* xv. 11. 1868. *Gaz. Hebd.* 1868, 50, p. 793.

In cases where the stricture is quite small, and pouched at its side, Dr. J. Mason Warren recommends the use of a conical wax bougie with the tip bent forwards, as more likely to pass the stricture than a straight bougie, which would be apt to become caught in the sac.

The treatment of stricture of the œsophagus resolves itself into attention to the general health, and mechanical or operative measures for the removal of the constriction.

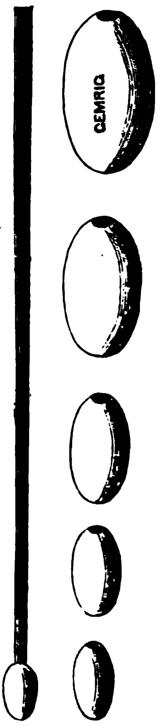
Where there is cancerous disease, the employment of local measures for relief of the constriction is, in the main, unjustifiable, because they usually produce injury which may be serious in character.

The local treatment consists in the mechanical dilatation of the stricture by the repeated passage of bougies, or œsophageal probangs of larger and larger size, or of metallic tubes which, by mechanical arrangements externally, can be gradually dilated after their introduction. Fig. 43 represents a very common and useful form of dilator for stricture of the œsophagus. It is composed of ivory olives attached to a flexible whalebone rod, a number of which instruments of graduated size are necessary for the treatment of the affection.

The bougie or dilator is employed every day, every other day, or at more lengthened intervals, according to the tolerance of the parts and the progress of the case; being retained several minutes at each introduction, and followed by the mere passage, in and out, of a larger instrument shortly after the withdrawal of the first one. This method is continued, if applicable, until it is pretty certain that nothing further is to be gained in this way, when the patient may be dismissed, with instructions to continue the passage of the instrument once a week or once a fortnight, to prevent or retard the recurrence of the constriction, a condition which is very likely to take place.

Forcible dilatation, by mechanical separation of the sides of a double metallic sound, has sometimes been employed with success; but it is an operation which may prove injurious, and is to be undertaken with great care. Resort is also occasionally made to a combined method of gradual and forcible dilatation, consisting in passing a thin rubber tube along the stricture by means of a firm conductor, and then pouring water or quicksilver into the tube, to dilate the distensible portion within the grasp of the stricture.

Fig. 43.



Œsophageal Dilators for Stricture.

Attempts are sometimes made to destroy the cicatricial tissue by means of caustics carried to the parts in a protected tube, so as to avoid contact with the sound tissues. This method has proved successful in a number of instances, but requires great caution in selecting cases suitable for it.

Division of the stricture has been performed by means of a concealed lance at the extremity of a metallic tube, the knife being projected when the stricture is felt, and then carried through it and retracted as soon as the want of resistance shows the stricture to have been passed. Dilatation is then kept up by means of œsophageal tubes and bougies frequently introduced.

Œsophagotomy has occasionally been practised in stricture of the œsophagus, but the results have not been successful as to cure.

The cure of a stricture usually requires very protracted treatment, varying from six to eighteen months on the average. Many cases are altogether insusceptible of treatment, and terminate fatally in a few months or a few years.

In this slow way the celebrated English physiologist, Marshall Hall, fell a victim to a stricture of the œsophagus, with ulceration of a dilated sac of the pharynx and œsophagus above the seat of stricture. Post-mortem examination revealed the fact that the stricture was not very great, but that a fold of mucous membrane at its upper portion, and pointing upwards, formed a sort of valve which prevented the passage of food, though there was space enough, as found after death, to pass the finger through the stricture from below upwards.

Professor Billroth, of Vienna, has suggested[1] the excision of a portion of the œsophagus in cases of carcinomatous disease, being disposed to consider favorably of the operation in consequence of the success which so frequently attends the operation of œsophagotomy for foreign body, and from the fact that, as a rule, cancer of the œsophagus remains confined to its original locality, and does not extend to the lymphatic glands. From some experiments made by him upon the dog, he is inclined to regard the operation as holding out a reasonable hope of success. Nourishment could be maintained through the wound at first, and afterwards, as cicatrization took place, through the mouth, the stomach tube being employed until its use becomes no longer necessary; this being the plan employed in the experiments alluded to.

In one of his successful experiments upon the dog, he removed an entire section of the œsophagus, an inch and a half in length; and when the animal was killed, some time after recovery, it was found that the cicatrix was very narrow, hardly half a line in breadth. Billroth is of opinion that operations of this kind ought to be as successful as the parallel operations of external urethrotomy in cases of loss of substance of the urethra from ulceration or gangrene, operations which are followed by perfect restoration of function.

---

[1] *Archiv für Klinische Chirurgie.* Bd. xii., part 1, 1871, p. 65.

The resulting cicatricial stricture would be apt, in the one case as in the other, to yield to systematic dilatation.

A constriction of the œsophagus is sometimes produced in consequence of the pressure of a cancerous or other tumor on the exterior of the tube. Such cases sometimes occur in connection with goitrous tumors which have extended downwards and backwards. These cases must be carefully differentiated from stricture of the œsophagus the result of disease in the tube itself, for they are not amenable to local treatment. A few cases have been recorded in which more or less temporary amelioration has followed the careful introduction of tubes for the purpose of supplying nourishment; an enlargement of the available calibre of the œsophagus having resulted.

SPASM OF THE ŒSOPHAGUS.

A spasmodic constriction of the œsophagus is not unfrequently met with, and is known as spasmodic stricture of the œsophagus. The inability to swallow usually occurs suddenly and unexpectedly, and is often attended with pain and a sense of constriction of the part. It is usually met with in individuals subject to affections of the intestinal canal, of the spinal column, or other organs, and is often one of the manifestations of that condition which we denominate hysteria. Though occurring most frequently in nervous females, it affects males also. It has been noticed at all ages.

Spasm sometimes exists for years. The nature of the affection is diagnosed by the passage of an œsophageal bougie, an operation which often cures the spasm at once. Where this does not happen, and there is no doubt as to the diagnosis, the passage of the sponge probang saturated with a solution of nitrate of silver, and repeated every few days, is often adequate to relief. Sometimes the constriction ceases as suddenly and as unexpectedly as it commenced.

The general health is to be attended to, tonics being usually called for. The internal administration of antispasmodics, and the application externally along the spine of a mustard poultice, a blister, or a stimulating liniment, will also often be indicated.

The passage of the electric current, the positive pole being applied to the seat of spasm by means of the œsophageal electrode, will often promptly overcome the constriction; the source of the electricity, in the main, being a matter of indifference.

DILATATION OF THE ŒSOPHAGUS.

An abnormal dilatation of the œsophagus is sometimes met with, chiefly as a pathological curiosity. Most of the subjects of this affection had been addicted during life to a species of rumination.

M. Raymond[1] reports a case in which the abnormal dilatation took place between the lobes of the lungs, from the base of the heart to the cardia.

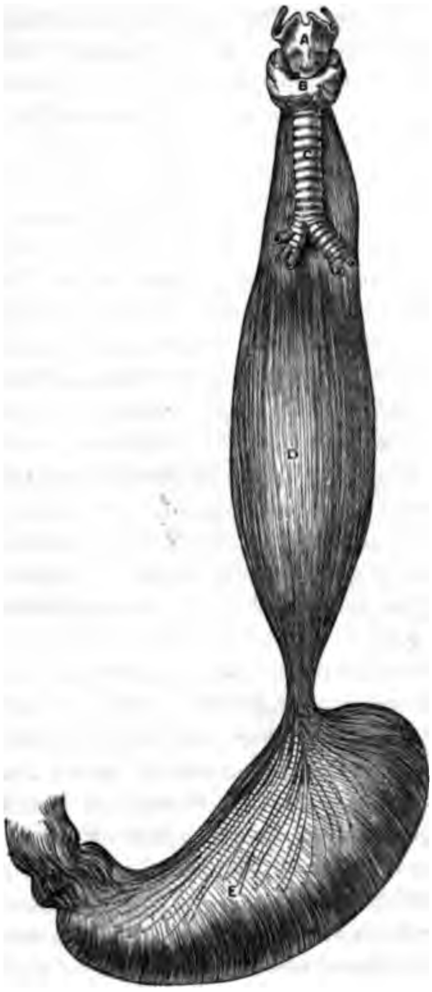
Prof. Luschka has reported[2] a very remarkable case of this kind in a woman some fifty years of age, who, from her fifteenth year, had possessed the faculty of voluntary regurgitation of food, without effort and without pain. Towards the close of her life she suffered with rheumatism, hemorrhagic erosions of the stomach and œsophagus, leading to the vomiting of coagulated black blood, from the loss of which, with the coexistent cancerous degeneration of several lymphatic glands, a condition of debility was produced which terminated fatally by œdema of the lungs. A post-mortem examination revealed the existence of an enormous dilatation of the œsophagus (Fig. 44), nearly equalling in bulk the capacity of the stomach. There was no constriction of the cardiac portion below it, as in the cases reported by Rokitansky and others. The dilated œsophagus was 46 centimetres in length instead of 29 centimetres, the normal length. Hence it is evident that it must have occupied a curvilinear position during life. At the point of greatest

---

[1] *Gaz. Méd.* Paris, 1869. No. 7, p. 91.

[2] Virchow's *Archiv für Anat.*, &c., March, 1868, p. 473.

Fig. 44.



Enormous dilatation of œsophagus 1-6 natural size (Luschka).
A larynx.
B thyroid gland.
C trachea.
D œsophagus.
E stomach.

enlargement it equalled the size of the arm of a muscular man, being 30 centimetres in circumference; the medium circumference being normally but 7½ centimetres. A sort of spindle shape was given to the enlargement by a slight constriction at the border of the upper and middle thirds, where it occurs in the normal œsophagus. The muscular layer was hypertrophied, and the mucous membrane gave evidence of the existence of intense catarrhal inflammation, with the existence of the hemorrhagic erosions that were suspected during life.

PARALYSIS OF THE PHARYNX AND ŒSOPHAGUS.

Paralysis of the muscular fibres of the pharynx and œsophagus is sometimes met with. If the dysphagia indicative of this condition occurs at the initial moment of deglutition, the trouble is likely to be situated in the pharynx; if at a later moment, it may be in the œsophagus. It sometimes occurs in the course of acute disease, as one of the precursors of death. Liquids are sometimes swallowed with great difficulty, and the attempt at deglutition is accompanied by contortions of the head and neck to assist their passage. Not unfrequently, the liquid passes into the air-passages. In chronic diseases, in which the brain and spinal cord become affected, the power of swallowing is sometimes lost a long time before death, the approach of which may be retarded by the use of the stomach tube for the injection of nutriment.

Sometimes the paralysis occurs in the wake of diseases, such as diphtheria, after convalescence has been established; and sometimes it appears to occur as an independent affection.

The author recently encountered a case of inability to swallow solids from paralysis of the constrictor muscles of the pharynx, the result of sun-stroke. The affection continued for several months, during the last three of which the patient was under the author's personal care. Faradization of the constrictors, repeated every two or three days, finally resulted in a cure. The negative pole was placed upon the muscles of the pharynx and moved from one to the other, the positive pole being held in the hand or placed at some indifferent portion of the body.

The local employment of electricity in some of its forms, and the internal administration of a salt of strychnia, or its hypodermic use, would seem, with the aid of tonics and nourishing broths, to be the most appropriate treatment for cases of this nature.

If the œsophagus be paralyzed, there may be danger in using an œsophageal electrode, as shown by Duchenne, for fear of unduly exciting the pneumogastric nerve, and thereby inducing syncope.

A case of paralysis of the œsophagus coming on during pregnancy, and returning during a second pregnancy, occurred under the care of M. Demarquay,[1] in which notable amelioration followed a treatment by electro-puncture.

GLOSSO-PHARYNGEAL PARALYSIS.

A certain variety of progressive general paralysis, almost always fatal, makes its first appearance as a local involvement of one or more of the muscular factors concerned in the performance of the functions of mastication, deglutition, speech, and respiration.

It has been called glosso-laryngeal paralysis, glosso-pharyngeal paralysis, labio-glosso-laryngeal paralysis, &c. To designate most of the main factors of the malady in one appellation we should require a name as long as labio-glosso-pharyngo-laryngeal paralysis; and then we would not have indicated its connection with the palate and the cheeks.

Attention was directed to this special affection by Prof. Trousseau in 1844; but marked professional notice was first prominently called to it by Duchenne (of Boulogne) in 1860, and subsequently again (1864) by Trousseau, and by Ollivier; since which time it has formed the theme of many valuable articles in the medical journals of Europe and America.

Recently, Duchenne has again called marked attention to the subject[2] in an elaborate essay upon the structure and morphology of the medulla oblongata.

---

[1] *Bull. Gén. de Thérap.*, July 30, 1869, p. 82.

[2] Recherches incono-photographiques sur la morphologie et sur la structure intime du bulbe humain, leur application à l'étude anatomo-pathologique de la paralysie glosso-labio-laryngée.—*Arch. Gén. de Méd.*, May, 1870, p. 539, *et seq.*

The affection has been more frequently observed in males than in females; and, as a rule, in subjects of over fifty years of age. Some observers have never seen it before the age of forty. Two of the author's cases, one subjected to treatment, and the other not, were under thirty years of age. There are one or two instances on record in which the disease, or an affection simulating it to a remarkable degree, began during an access of febrile disease. Usually, some mental trouble, such as loss of property, of members of one's family, etc., appears to be the exciting cause. In the case of the youngest subject which the author has seen, the cause seemed to be over-study for honors at college.

The affection usually begins with a paralysis of the orbicularis oris and adjacent muscles, gradually progressing, until finally the patient is unable to pronounce the consonants and vowels requiring the use of the lips, such as *o*, *m*, *p*, *b*, *f*, *v*, and in a little while is unable to blow or to kiss. As the disease progresses the tongue becomes involved, and then the palate, the pharynx, the cheeks, and the larynx. Sometimes it begins in the tongue, with failure in the pronunciation of the dentals, etc., *t*, *d*, *n*, *th*, *ch*, etc., and more or less difficulty in controlling the alimentary bolus. There therefore occurs more or less dysphagia, gradually progressive; nasal speech, and escape of drinks from the nostrils; inability to retain the saliva; and aphonia. At a further stage of the affection the respiratory muscles become affected; and finally, in some instances, there ensues paralysis of the limbs. Sometimes cerebellar ataxia follows the affection, and this may take place even several months after satisfactory relief from the original affection.[1] The patient gradually sinks a prey to debility consequent upon inanition.

The pathological observations thus far made show this affection to be due to sclerosis or other structural lesion of the medulla oblongata, with fatty or tuberculous degeneration of the roots of the nerves distributed to the parts affected by the disease; or sometimes a mere atrophy, a fatty degeneration of the muscular fibres of the parts affected, has been found to exist, though this does not constitute an essential element of the lesion. The disease, as a rule, is fatal. A few cases of recovery or of retrogression,[1] and several of amelioration, persisting for a long time,[2] are on record; and in these it must be inferred that there has been merely a congestion at the roots of the nerves, a hemorrhage, or some other condition preparatory to the stage of degeneration, the tendency to which has been fortunately overcome.

---

[1] Schützenberger: Cas de paralysie labio-glosso-pharyngienne suivie d'ataxie cérébelleuse. *Gaz. Méd. de Strasbourg*, 1868, p. 74.

Counter-irritation at the nape of the neck, iodide of potassium, or its equivalent, internally, and local faradization of the affected muscles, appear to be the chief remedial agents relied upon for the treatment of this affection, the prognosis being always a grave one.

TUMORS IN THE ŒSOPHAGUS.

Tumors of the œsophagus are not of frequent occurrence. Dr. J. Mason Warren records[3] a curious case of a large polyp depending into the œsophagus, and attached to the outside of the epiglottis. The patient, a gentleman of fifty-four years of age, began to experience a soreness of the throat in swallowing, in 1860, and some ten weeks afterwards was able to force into his mouth a tumor from the œsophagus. This gave him but little inconvenience for six years, when it began to increase rapidly, and caused much trouble in deglutition. He applied to Dr. Warren some three weeks after the appearance of these troublesome symptoms, and forced into his mouth, by an effort of regurgitation, a large white-looking tumor of the shape and size of a small sausage. It resumed its situation in the œsophagus on a slight effort of the patient. The finger detected its origin in the neighborhood of the epiglottis; and a laryngoscopic examination showed this origin to be by a broad base, commencing low down on the left side of the epiglottis, which it dragged down and over to the same side, whence, by a ribbon-like pedicle, it extended into the œsophagus.

---

[1] *La Tribune Médicale*, 1868, p. 340; Alex. Smith, *Med. Times and Gaz.*, 1871, April 22, p. 464; the author, *The Medical Record*, vol. iv. p. 291.

[2] Hérard: *Gaz. Hebd.*, 1868, p. 182.

[3] Surgical Observations. Boston, 1866, p. 116.

Being brought up into the mouth, it was transfixed by a curved needle armed with a long thread. As it bled freely, it was tied by a strong ligature, as near the base as possible, and was then cut off in front with Simpson's long-curved scissors.

The portion removed was about three inches in length and two inches in circumference. It was of a fibrous character. Gentle drawing upon the ligatures for two or three days induced the spontaneous expulsion of the pedicle.

Dr. Gibb[1] relates a case of large, pendulous, fatty tumor in this situation, in a man of eighty years of age, who had had throat symptoms for twelve years, and who died suddenly while smoking.

Four years before his death, during an act of vomiting, a large mass protruded, which he was obliged to return as soon as possible, to prevent suffocation.

A large, pendulous, fatty tumor was found filling the pharynx, and extending into the œsophagus to the extent of nine inches. It was attached by an envelope of mucous membrane and fibrous tissue to the left side of the epiglottis, which it dragged downwards and to the left side so as to prevent perfect closure of the larynx, and it was also connected with the upper part of the pharynx.

Middeldorpf[2] narrates the case of a man of twenty-six years of age from whom, in January, 1853, he removed an œsophageal polyp, after having encircled its base, near the root of the tongue, by a strong silken ligature. The excision was practised about three-fourths of an inch in front of the ligature. The excised portion was three inches in length and an inch and a half in diameter, and weighed, after a great deal of blood had flowed from it, one ounce and three drachms. Examined under the microscope, it proved to be a fibroid tumor with numerous vessels and papillæ. The ligature came away with the remains of the polyp upon the twenty-first day. Five years after the operation the patient was still well.

---

[1] On the Throat and Windpipe. 2d ed., p. 371.

[2] Schmidt's *Jahrb.* 99, p. 131.

In Middeldorpf's case, and in that of Warren, the ligature was secured to the ear.

Professor Rokitansky, Dallas, Middeldorpf, and others have also recorded cases in which the length of the tumor exceeded six inches.

WOUNDS OF THE ŒSOPHAGUS.

The œsophagus is not infrequently wounded in connection with injuries inflicted upon the larynx and trachea; but cases of wounds limited to the œsophagus are rare, and are said to be usually the result of gun-shot wounds from small bullets, or to be due to puncture by the point of a knife, sword, or dagger. Hourteloup[1] has only been able to collect four cases of incised wounds of the œsophagus: those of Boyer, Larrey, and Dupuytren.

When occurring in suicides, there has usually been fatal hemorrhage from division of the great vessels of the neck. Attempts at exploration of the œsophagus by means of the sound have been followed by laceration of this tube, as has also the incautious use of improper instruments in attempts at the extraction of foreign bodies. It has also been wounded occasionally in making the incision for tracheotomy; and a case is on record in which the tracheotomy tube was actually passed into the œsophagus.

M. de Guise, a surgeon of Charenton, has reported (Compte-rendu de la Soc. de Chir.) the case of an insane person who introduced into the œsophagus the handle of a little explosive toy, which lacerated the organ a little below the pharynx, and then fractured the fourth rib at the vertebral articulation.[2]

Lacerated wounds of the œsophagus are sometimes produced during an act of vomiting. Several cases of rupture from this cause are on record, the subjects of the accident usually being persons of intemperate habits. The injury is almost necessarily fatal, for there is no external outlet for the matters which escape from the œsophagus.

---

[1] Plaies du Larynx, de la trachée, et de l'œsophage. Paris, 1869, p. 19.

[2] Hourteloup, op. cit. p. 24.

Rupture of the Œsophagus.—Hourteloup[1] reproduces the following case of Boerhaave (Van Swieten's Commentaries, vol. ii., p. 102. Edinburgh, 1786):

A Baron Vassenaer was accustomed to relieve himself by vomiting whenever he had committed an excess at table, which occurred frequently. One evening, after dining copiously, he endeavored to assist the emesis by an infusion of chardon bénit, and vomited, making extraordinary efforts. Suddenly he was seized with a very acute pain, which was increased by whatever he attempted to swallow. Death occurred after eighteen hours of intense suffering. The lungs were found swimming in a fluid similar to that found in the stomach. There was a transversal rupture of the œsophagus, three fingers' breadth, above the diaphragm. The most careful examination discovered no trace of ulcer or erosion of the ruptured organ.

Dr. J. J. Charles, of Belfast, records[2] a case of a man, ætat. 35, of intemperate habits, who, while vomiting, felt something give way in his inside, and died about seven and a half hours afterwards. A longitudinal fissure was found, penetrating all the coats of the œsophagus, on the left side, near the posterior wall, reaching from immediately below the cardiac orifice of the stomach upwards for an inch and a half, but extending farther in the mucous membrane than in the muscular and fibrous coats.

Dr. Charles, who likewise mentions Boerhaave's and some others, cites a case reported by Mr. Dryden,[3] a surgeon of Jamaica, in which an officer, after inebriation, was seized with nausea and an inclination to vomit, to promote which he drank some warm water; and during the straining which it produced he felt something give way internally, which gave him the sensation as if he had received an injection of some liquid matter into the cavity of the thorax.

Emphysema of the neck ensued. The patient died in eight or ten hours. A longitudinal laceration, large enough to admit the fore and middle fingers, was discovered in the œsophagus, just before it passes through the diaphragm.

---

[1] Plaies du larynx, de la trachée, et de l'œsophage. Page 23.

[2] *Dub. Quart. Jour. Med. Science.* November, 1870, p. 311.

[3] *Medical Commentaries*, Edinburgh. Decade 2. Vol. iii. 1788.

About a gallon of a mixture of wine, water, and food was contained in the left pleura; and nearly two quarts of the same kind of fluid in the right pleura.

Dr. Monro, *Morbid Anatomy*, 1811, p. 311, mentions a similar instance, communicated to him by Dr. Carmichael Smyth. Other references are given by Dr. Charles, which may be consulted with advantage in further elucidation of the subject.

The treatment of wounds of the œsophagus must be conducted on general principles, suited to the exigencies of the case. Under some circumstances the opening into the gut must be kept patulous, in order to permit the injection of food into the stomach. As soon as there is evidence that cicatrization is proceeding favorably, food is cautiously administered in the natural way, care being taken with regard to its quantity and quality. If food pass out of the wound, nourishment must be maintained by the rectum; and thirst allayed by moistening the lips, tongue, and gums from time to time, and by periodical sponging of the body. Great precaution is necessary, in the return to an ordinary diet, that the cicatrix be not ruptured.

There is no evidence to show that wounds of the œsophagus are liable to be followed by permanent constriction of the tube. Fistulous openings sometimes remain after the healing of a wound in the œsophagus. They are treated by the local application of nitrate of silver or sulphate of copper, and are said to heal promptly. It is not generally considered advisable to make an attempt to close them by plastic operation, as is practised in cases of fistules communicating with the larynx or trachea.

Most authors are opposed to the use of sutures in cases of wounds of the œsophagus; but, as is urged by Prof. Gross, there is probably too much temerity shown in this respect; for such wounds would seem to call for treatment similar to that adopted for wounds of the intestines, and he therefore recommends that they be united by the interrupted suture, both ends of which should be cut close to the knot, in the expectation that the thread would find its way into the interior of the tube and be discharged with the contents of the bowel.

FOREIGN BODIES IN THE ŒSOPHAGUS.

Foreign bodies occasionally lodge in the lower portion of the pharynx and in the œsophagus, and may produce death from asphyxia in a few minutes, from compression of the trachea. A number of cases of this kind are on record in professional journals, and in the newspapers. The occurrence of this accident has sometimes been mistaken for a stroke of apoplexy. The foreign body usually is some article of food—as a large morsel of meat, a piece of bone, etc.; but not infrequently is something that should not have been put in the mouth at all—such as a coin, fish-hook, pin, tack, etc. Human parasites sometimes lodge in the œsophagus as a foreign body. A case of acute delirium from this cause has been reported by Laurent. Lately, since the wearing of false teeth has become so common,[1] the plate is sometimes swallowed during sleep and becomes wedged in the œsophagus or pharynx.

The accident sometimes occurs, in cases of stricture of the œsophagus, from want of care in swallowing morsels of food.

The point of lodgment of the foreign body is usually the lower portion of the pharynx or the upper portion of the œsophagus; but it is sometimes much more deeply situated, opposite the upper portion of the sternum, or about the region of the diaphragm. A not infrequent place of lodgement is in the pyriform sinus formed by the inner wall of the wing of the thyroid cartilage and the outer wall of the quadrangular membrane of the pharynx.

The symptoms of the presence of a foreign body in the œsophagus will vary with the nature of the intruder and the position it occupies. A smooth and small body may give rise to very slight symptoms—merely, perhaps, the consciousness of having swallowed it, and a vague sense of its presence in some particular part of the gullet. A larger body will give rise to gagging and vomiting, during which efforts it is often detached. A pin will give rise to a sensation of pricking, and sometimes to slight hemorrhage. Large bodies prevent further swallowing by their size, and sharp ones by the pain which the effort produces. If the body is large or irregular, or presses upon the trachea, or sticks by a point to some portion of the larynx, there will be more or less pain in swallowing or in breathing, which will be apt to be increased on pressure. Cough, spasm of the glottis, hoarseness, and symptoms of an inflammatory character may supervene, and sometimes may increase to such an extent as to be very serious. The only certainty of diagnosis rests in exploration with the finger or the probe, unless the foreign body can be seen with the laryngoscopic mirror or without it.

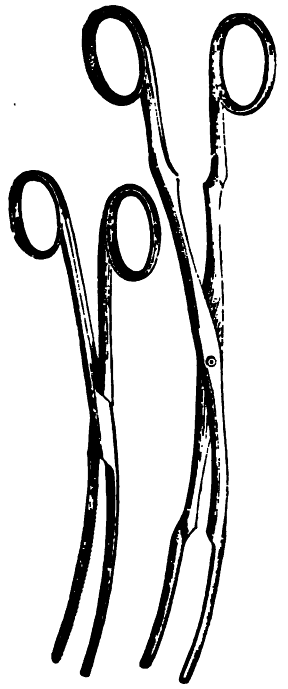
---

[1] *Ann. Méd. Psych.*, Sept. 1867.

If a foreign body is not removed from the œsophagus it may give rise to inflammation and abscess, and produce ulceration of the tissues in front of it. Foreign bodies sometimes make their way to the exterior in this manner, and may thus give rise to the formation of a fistule. Or the foreign body may ulcerate the anterior part of the tube and enter the trachea, producing death from suffocation or from inflammation of the air-passage; or it may result in the formation of a tracheo-œsophageal fistule, and thus produce irreparable mischief. A singular case of this kind came under the author's notice a few years since. He was called in consultation to a neighboring city to examine a man with chronic hoarseness of several months' standing. The story was, that about a year, or rather more, previously, the patient had swallowed, during his sleep, a gold plate to which a false tooth was attached. The physician who was called in to the case felt the foreign body with his finger, and, failing to extract it, pushed it forcibly into the stomach. A few months later, the author was again sent for on account of a new set of symptoms. He found the patient feeble and in bed, unable to eat or drink, every attempt at drinking being followed by ejection of the fluid in a paroxysm of spasmodic cough. Laryngoscopic inspection did not reveal anything more than the general inflammatory condition recognized at the previous interview, except that there was a profuse secretion of pus. The cough and ejection did not follow immediately upon the act of swallowing, but a few moments after, as the fluid passed down the œsophagus. An opinion was therefore given that a fistulous connection existed between the œsophagus and trachea, produced by chronic inflammation following a wound made by a sharp edge of the plate, in the effort at pushing it into the stomach. A request to be permitted to pass the stomach-tube was not acceded to, inasmuch as it had been passed into the stomach a short time before, by the physicians in attendance, without encountering any obstruction, though pus was brought up on its extremity, the passage of the instrument being painful to the patient. The patient was nourished for nineteen (?) days by the rectum, and was doing well, being again able to swallow with very little difficulty, when he one day ate a number of apples that had been brought into his room, was seized with cholera morbus, and died. A post-mortem examination was made, and the gold-plate was found lodged in the œsophagus opposite the bifurcation of the trachea, with a communicating opening between the two tubes.

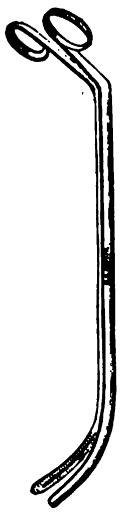
The treatment of a foreign body in the œsophagus consists in its prompt dislodgement. This may be effected in various ways according to the nature of the body, and the emergency or peculiarity of the case. If the foreign body can be seen or felt, it can often be removed by the finger, or by means of straight or slightly curved forceps, such as are used in torsion of nasal polyps. If it is lodged in one of the pyramidal sinuses, it can be seen with the laryngoscope and removed with the laryngeal forceps, or be dislodged by a blunt hook, when it will be spit up. A long finger will often be able to hook out a foreign body from this position. In cases of the swallowing of such articles as fish-bones, needles and pins, which often lodge in this situation, care must be taken not to mistake for the foreign body the tense pharyngo-epiglottic ligament, which gives to the untrained finger much the sensation of a firm and slender foreign body. This mistake has been made by the author, and doubtless by many others, though not mentioned in the books. Under a misapprehension of this kind the forceps may be employed to pull out some of the normal tissues. A laryngoscopic inspection will usually set any doubt at rest; and when this cannot be made, examination of both sides will determine whether the sensation imparted to the finger is that from a foreign body, or from a normal fold of tensely stretched tissue. If the foreign body is situated lower down it may usually be extracted by the œsophageal forceps of Dr. Bond, Fig. 45, or by those of Dr. Burge, Fig. 46, the instrument being oiled and warmed, and used in the first instance as a searcher, and subsequently expanded over the foreign body, care being taken to attempt to seize it by one of its small ends so as to facilitate its removal.

Fig. 45.



Bond's Œsophageal Forceps.

Fig. 46.



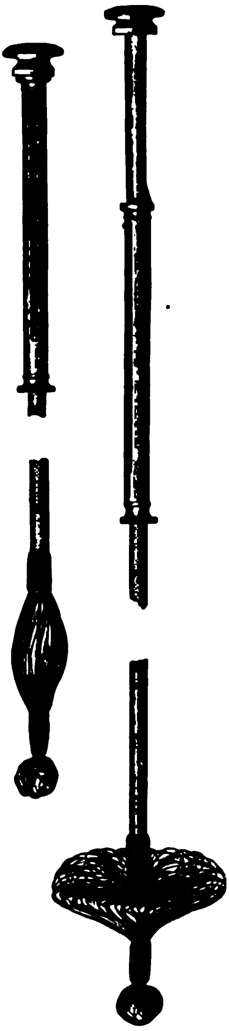
Burge's Œsophageal Forceps.

These forceps are bevelled at the edges so as to prevent injury to the mucous membrane.[1] Blunt hooks of various patterns, some of which are exposed only when past the foreign body, are often used, but are apt to injure the mucous membrane. One of the best of these is a double conical hook, swivelled to the conducting rod, with the larger and projecting portions upwards. This is intended to be pushed past the obstruction, and then drawn back, when one of the projecting wings will catch in the foreign body and bring it out with it. As the foreign body is usually of larger size than the swivel, the mucous membrane of the œsophagus is protected from injury in the withdrawal of the instrument. For large pieces of bone, and other hard substances, this instrument is often admirably adapted. It is sometimes called a coin-catcher. Bags of silk and gauze, attached to whalebone rods, to be pushed past the body and then catch it as the instrument is withdrawn, are often employed. A great deal of ingenuity has been displayed in the invention of instruments for the purpose of extracting foreign bodies from the œsophagus, a mere description of which would occupy many pages.

---

[1] Forceps formed of links have been made. A pair of this kind is pictured in *Gaz. Hebdomadaire*. 1869. No. 10, p. 154.

Fig. 47.



Horsehair snare and probang for the extraction of foreign bodies from the œsophagus.

One of the very simplest and best, and which has often done good service in the author's hands, is the old French horsehair snare and probang, Fig. 47, which is pushed into the stomach, the sponge on the end being oiled before introduction. The button at the end of the handle is then pulled out of the tube, and with it the rod to which the sponge is attached. This makes a circular snare of the horsehair as seen in the lower drawing, in the meshes of which the body is caught and thus drawn into the mouth.

When the body is of a nature such as the gold-plate in the case narrated, the proper operation would be to bend it up with a strong pair of forceps and then to extract it. Had such a procedure been instituted in that case, the man's life would not have been sacrificed.

When the foreign substance is one susceptible of digestion, and cannot be removed by instruments, it may safely be pushed down into the stomach by means of a stout probang armed with a moistened sponge. Even when not digestible, if of such a form that there is no danger of wounding the mucous membrane, it may be pushed down, for cases are plenty in which coins and other substances swallowed by children have traversed the intestinal tract and been discharged from the rectum. A body must be pushed down with great care, especially if it have any sharp corners, or serious injury may be produced. Prof. Stromeyer mentions an instance in which the pleura was penetrated, producing death. Another case is reported by Thomas Green.[1]

The retention of a foreign body in the œsophagus is sometimes productive of death.

A case is mentioned by Mr. Lee,[2] in which a copper halfpenny had been swallowed by a child of five years of age. It was forced into the stomach. Enteritis followed, resulting in death. The coin could not be found on the post-mortem examination. The death was due to the mechanical irritation produced by the passage of the coin through the intestinal tract, and to poisoning by the copper, evidences of the existence of which in considerable quantities was discovered on testing the mucous membrane and contents of the intestines.

A case is reported by Dr. Alex. Steven[3] in which a nail produced caries of the spine with secondary consolidation of lung, amyloid disease of liver and spleen, etc., producing death.

The presence of a counterfeit coin some twelve months in the œsophagus of a convict produced ulceration and perforation of the aorta.[4]

Many other cases of similar nature are on record, showing the necessity that exists for making due attempts to extract a foreign body from the œsophagus.

---

[1] *Brit. Med. Jour.*, Dec. 17, 1870, p. 650.

[2] St. George's Hospital Reports, Vol. iv. 1869, p. 219.

[3] *Brit. Med. Jour.* Dec. 10, 1870, p. 629.

[4] *N. Y. Med. Jour.*, Dec. 10, 1869, p. 335.

When the foreign body is firmly lodged and the symptoms of distress or danger to life are severe, the operation of pharyngotomy or of œsophagotomy is called for, and offers a fair promise of success. Several very satisfactory cases of this kind are on record.

Foreign bodies sometimes remain for months and years in the pharynx and œsophagus, and cause comparatively little suffering. They are sometimes discharged spontaneously; sometimes, as in the case of needles and pins, they work their way to the surface, and to any part of the surface, in fact; and sometimes they are dislodged, and can be extracted by means of the forceps or snare. It is probable that they become encysted in some cases, and in others produce an abscess, with the contents of which they are discharged.

A remarkable case of transit of foreign body came under the author's notice some years ago, in the person of a very old man, who in his youth had swallowed two pins. The old-fashioned pins with the twisted heads could be distinctly felt under the skin over one of the man's shoulders, where they had remained for more than thirty years, the individual declining to have them cut down upon and removed. They went into his coffin with him.

Prof. Stromeyer mentions a case in which a needle had been swallowed, the passage of which he followed for ten days into the stomach and through the left lung, where it produced bloody expectoration. These needles pass likewise into other organs, and produce inflammation. Sometimes a bundle of needles is swallowed with suicidal intent, and produces death after a long series of years.

A curious case is narrated[1] in which an insane woman swallowed a fork with the expectation of dying under the operation which would have to be performed for its removal. An abscess formed in the abdominal walls, from which the fork was removed; and after this the patient recovered.

In cases where extraction through the mouth is impossible, and where the operation of œsophagotomy is contra-indicated, the case must be treated on general principles, or expectantly. Rest of body, nourishment by enema, tonics by enema or hypodermically, would constitute the general plan of management. Should an abscess form and point externally, it should be early cut down upon.

---

[1] (*Mediz. Jahrb.*, 1867, Vol. I.) *Gaz. Méd. Strasbourg*, 1868, p. 20.

Some individuals are subject to a recurrence of the lodgement of articles of food in the pharynx or œsophagus from liability to spasm of the constrict or muscles of the pharynx or of the circular fibres of the œsophagus. The swallowing of a bolus on top of the arrested morsel, or of a copious draught of water, usually suffices to force the body down. If this does not answer, the services of a surgeon are required to accomplish the purpose with the probang.

A recurrence of the accident may be sometimes avoided by the repeated passage of the œsophageal bougie, which obtunds the sensibilities of the parts and thus renders them less liable to spasm. In some instances of this kind, the frequent recurrence of the paroxysm points to the formation of an organic stricture, and if there be reason to believe that such is the case, the passage of the sound is the more strongly indicated.

FANCIED BODIES IN THE PHARYNX AND ŒSOPHAGUS.

Hysterical patients often fancy that they have a foreign body in the throat. We sometimes meet cases, not at all associated with hysteria, in which this fancy exists. The parts are normal on inspection, but the patient cannot be dissuaded from the idea of the presence of a foreign body. Sometimes this condition is attended with an unwillingness, or, perhaps, an inability to swallow solid nutriment, but not from any paralysis of the constrictor muscles of the pharynx, as these contract readily on being titillated. Sometimes, too, there is a vague dread of suffocation. Occasionally there is a true history of a foreign body which has probably been expelled. The position occupied by the fancied body often changes. At one interview it will be in the œsophagus; at another, at the upper part of the pharynx, and so on. Sometimes the sensitive point will be changed by the swallowing of a glass of water, or a solid morsel, or the passage of the œsophageal sound.

Occasionally a small point of ulceration in the pharynx will be found as the source of trouble, especially in those cases where the sensation of a foreign body is increased by swallowing. In other cases the affection is dependent upon some disturbance of the nervous, digestive, or uterine system. Other cases must be regarded as pure neuralgias; and there is no doubt that some patients suffer a good deal. The affection is often associated with anæmia and debility.

These cases are sometimes of long standing, and very obdurate to treatment.

The internal administration of iron, quinine, strychnia, or arsenic, alone or in combination, with attention to any specially deranged functions, will form the most appropriate general treatment, while the local sensibilities of the parts may often be materially modified, and sometimes promptly subdued by the application of solutions of nitrate of silver, or some substitute for it; and a similar effect will sometimes follow the use of the electric current, with the positive pole in contact with the parts.

Cases dependent upon actual ulceration are usually promptly relieved by a few applications to the ulcer of nitrate of silver or a mineral acid—sometimes by a single application.

ŒSOPHAGOTOMY.

Œsophagotomy is the term under which are included all operations for gaining access to the œsophagus or the pharynx from the exterior of the body. When the opening is made into the pharynx, the operation performed has been pharyngotomy; but it is usual to consider the two operations under the same head, inasmuch as their line of demarcation is not very distinct, anatomically or surgically.

Operations of this kind have not been performed very frequently, twenty-five or thirty of them representing, perhaps, the entire number on record.

The indications for an operation of this kind are presented in cases of a foreign body in the tube which cannot be removed by other means; in cases of constriction of the tube from organic stricture, or the pressure of a tumor on the outside, in order to afford a means of conveying nourishment into the stomach. It has also been performed in dysphagia, from laryngeal ulceration, and in a case of this kind performed by Dr. John Watson, of New York, the patient was nourished for three months, when he died of pneumonia. The operation has been suggested also for removal of a diverticulum or pouch of the pharynx or œsophagus, and also for gaining access to abscesses in the tube threatening to rupture into the trachea.

The following method for performing this operation—for foreign body in the œsophagus—is recommended in Gross's Surgery:—

"The neck being stretched, the head retracted, and the foreign substance made to project as far as possible on the left side of the windpipe, an incision, several inches in length, is made directly over the swelling, through the skin and platysma-myoid muscle. The tube being thus exposed, and any vessels and nerves that may be in the way held aside, its wall is divided to the requisite extent, and the substance, whatever it may be, is extracted with the finger or forceps, as may be found most convenient. As soon as clearance has been effected, and the bleeding arrested, the edges of the œsophageal wound are neatly approximated by several points of the interrupted suture, made with very fine but strong silk, the ends being cut off close to the knot, to afford the ligatures an opportunity of dropping ultimately into the interior of the passage. The cutaneous wound being dressed in the usual manner, the case is managed upon general principles, the patient being supported during the first week with broths, conveyed, if necessary, by means of a tube, or, what will be better, introduced into the rectum."

A very excellent history of the operation, with a tabular statement of all the cases that the author could find on record at the time, and including two of his own, was recently published[1] by Dr. David W. Cheever, of Boston. To this we refer our readers for detailed information on this special subject.

---

[1] Two Cases of Œsophagotomy for the Removal of Foreign Bodies; with a History of the Operation. Boston, 1867.

A perusal of the cases collected by various authors shows that the operation is not without danger, only nine out of the sixteen operations for removal of a foreign body collected by Günther[1] having been reported as successful; a result quite different from that recorded in Dr. Cheever's pamphlet, which includes most of the cases collected by Günther, but which gives the successful cases as numbering thirteen out of seventeen. In three of the cases in Prof. Günther's list, in which he could not ascertain the result, success may have followed, as two of them (Bégin, 1832) are so recorded by Dr. Cheever.

The operation of œsophagotomy should not be unnecessarily delayed when once determined upon, on account of the risk of permanent or irreparable injury from inflammation, suppuration, etc.; and on account of the propriety of affording nourishment by the natural passage as soon as possible.

When the foreign body cannot be felt from the outside, a metallic sound should be passed into the œsophagus, and pressed against the external tissues so as to act as a guide for the place of incision, and to insure penetration into the interior of the tube. Even when the foreign body lies below the region of the neck affording access to the œsophagus, the operation is justifiable as presenting a better facility for the manipulation of the forceps. If the wound has to be dilated for this purpose, care must be taken not to injure important vessels or nerves. In one of the cases operated on by Dr. Cock[2] there was a permanent alteration of the voice, probably due to some injury inflicted upon the recurrent laryngeal nerve.

---

[1] Lehre von den blutigen Operationen. Leipzig, 1864. Vol. V. p. 269.

[2] *Guy's Hospl. Rep.* 1858, p. 217.

CHAPTER XII.

AFFECTIONS OF THE NASAL PASSAGES.

The Nasal Mucous Membrane.—The nasal mucous membrane is very often the seat of disease, and participates very readily in the affections of the neighboring structures. A brief survey of some of the points of its anatomical structure will aid in the study of the diseases to which it is subject.

The lining membrane of the nostrils is closely adherent to the periosteum of the bones constituting the framework of the interior of the nose, by connective tissue in which there are no fat-cells. Its free surface, in the normal condition, is smooth as a rule, except upon the lower turbinated bone, where it is often noticed raised in irregular mulberry-like projections the size of a hemp-seed, and covering as much of the bone as can be seen in the rhinoscopic image,—that is, its bulging portion. This gives the part a rough mamelonated appearance, which may readily be mistaken for a result of disease in chronic affections of this region. This extra thickness is in part due, according to the researches of Prof. Kölliker, to rich plexuses of veins embedded in the tissue. That portion of the membrane covering the septum of the nose is also smooth as a rule, but is sometimes arranged in closely adherent rugæ, giving it somewhat the appearance of muscular tissue. The membrane is richly supplied with acinous glands, which in certain locations, by their enlargement, often become the origin of nasal polyps. The epithelium of the mucous membrane is of the ciliary variety, and, in the upper portion of the nasal passages, has a special arrangement which is supposed to have some relation with the function of olfaction.

The mucous membrane of the sinuses communicating with the nasal passages is much less rich in glandular tissue, the maxillary sinus being better supplied in this respect than either the frontal, sphenoidal, or ethmoidal sinuses. The mouths of these glands sometimes become occluded, and give rise to the development of cysts, this result occurring most frequently in the upper maxillary bone.

The blood-vessels of the nasal mucous membrane are very numerous, but not of large size, and they anastomose very freely. The arterial vessels take origin principally from two sources, the internal maxillary and the ophthalmic arteries. The spheno-palatine portion of the internal maxillary gives off the posterior nasal artery, which passes into the cavity of the nose through the spheno-palatine foramen, and then divides on either side into an outer and an inner portion. The outer or lateral portion descends behind the turbinated bones, which it supplies, and, in addition to supplying the nasal passages, supplies also the antrum and the ethmoidal and sphenoidal cells. The inner or middle portion passes to the septum and divides into several branches, which descend obliquely forward, inter-communicating with the artery of the septum, a branch of the external maxillary artery. From the ophthalmic is given off the anterior ethmoidal artery, which passes through the anterior ethmoidal foramen, whence a nasal branch descends through an opening in the cribriform plate of the ethmoid bone. It supplies the anterior portion of the septum and the lateral walls of the cavity, as well as the anterior ethmoidal cells and frontal sinuses, before the entrance of its meningeal branch into the cranium. The capillaries from these various branches form a close reticulum which penetrates the substance of the mucous membrane and surrounds the glands, the anastomosing capillaries being enlarged aneurismally in some places.

The veins, in general, follow the course of the arteries, without any peculiarity except on the inferior turbinated bone, where, as shown by Kohlrausch, Kölliker, and others, they form a regular cavernous reticulum, which is spread out between the periosteum and the mucous membrane, increasing the thickness of the parts to the extent of some four millimetres.

This distensible tissue favors the sudden stoppage of the nose occurring in catarrhal affections of the nasal mucous membrane, and permits as prompt a subsidence under the use of remedies which constringe the blood-vessels; and it also explains the profuseness of the serous discharge which attends an ordinary catarrh.

After adult life, the mucous membrane lining the nasal passages and the sinuses communicating with them is liable to become more or less strewn with calcareous deposits, which sometimes accumulate in roundish or oval masses, and are then recognized by the eye as yellow spots.

Affections of the nasal mucous membrane are readily propagated to the contiguous sinuses, and also to the pharynx and larynx, as well as to the middle ear, by continuity of passage along the Eustachian tube, the pharyngeal orifice of which is in close proximity with the outer posterior margin of the nasal passage on either side, looking towards it in a direction downwards and inwards, as may be seen by a glance at the rhinoscopic images.

In addition to the ordinary results of inflammation, abscess, and ulceration, disease of the nasal mucous membrane is liable to take on a peculiar action productive of an offensive discharge, due, no doubt, in some measure, to decomposition of the pent-up products of secretion, but also due in part to some peculiarity of tissue, or of action in the tissue, the nature of which still awaits demonstration.

The bones of the nose, especially the turbinated bones, are often involved in the progress of inflammation of the nasal mucous membrane, the inflammatory action thus excited not infrequently terminating in caries and necrosis.

Extension of inflammatory action into the maxillary sinus sometimes produces abscess and dropsy of the antrum, or results in caries of the upper maxillary bone.

The various forms of polyp are often met with in this region, as also tumors of fibrous and osseous composition, and those of malignant nature.

EPISTAXIS.

Epistaxis, bleeding from the nose, is of very frequent occurrence. It may be idiopathic or traumatic. Sometimes it occurs as a vicarious menstruation. When occurring frequently, without apparent cause, and especially if the blood be thin, copious in quantity, and difficult to restrain, it is an evidence of the hemorrhagic diathesis, and under these circumstances may lead directly or indirectly to a fatal result. This form appears most frequently in boys, anterior to or just about the period of puberty. Epistaxis sometimes seems to occur as a relief to vascular turgescence within the cranium, and this often affords a spontaneous relief to a determination of blood to the head, and to violent cephalalgia, noises in the ears, vertigo, sleeplessness, dryness, heat, or irritation of the nasal passages, etc. This form of epistaxis is usually from one nostril only, but occasionally proceeds from both. Sometimes the blood pours out in a continuous stream, but more frequently drop by drop.

Bleeding from the nose sometimes attends certain diseases at their commencement, such as remittent and enteric fevers; and indeed, in combination with other symptoms, is regarded in some measure as pathognomonic of enteric fever; though it is well known to attend other affections, such as scurvy, purpura, disease of the spleen, etc. Sometimes it occurs at the so-called critical periods of pneumonia and various fevers.

It may occur in several local diseases as a result of ulceration; in chronic rhinorrhœa, especially that form known as ozœna; and it may attend disease of the cartilage or bone, or be connected with the disturbance occasioned by the presence of a foreign body, a polyp, or other growth, or a calcareous concretion either in the nasal passage itself, or in one of the communicating sinuses.

Epistaxis may be occasioned by violent sneezing, whether occurring spontaneously, or as a result of snuffing up irritating substances; and it also follows external injuries, such as falls upon the part, or a direct blow from the fist, whether there be fracture produced or not. Sometimes it is produced by picking the nostril. It is not unfrequently encountered in the aged as a perfectly physiological process, or in relief of various congestions of the head or face.

Spontaneous epistaxis sometimes follows exposure to cold, or exposure to immoderate heat after exposure to cold.

A passive form of epistaxis sometimes occurs in connection with organic disease of the heart, with extensive exudation into the pleural sac, in emphysema of the lungs, in cases of goitre, etc., from the impediment offered to the free return of the circulating blood to the heart. It is also occasionally met with in various affections of the abdominal viscera, such as ascites, ovarian dropsy, etc., on account of the pressure exerted upon the diaphragm, impeding free respiration, and thus inducing a stasis of the venous circulation.

Hemorrhage from the nose, as also from other outlets, has been known to occur from diminution of atmospheric pressure in ascending lofty mountains, and cases of this kind have been narrated by Humboldt as occurring at Chimborazo, by Saussure at Mont Blanc, by Bouguer at the peaks of the Cordilleras, etc.

Epistaxis has been known to occur sometimes in infantry soldiers fatigued by long marches in hot weather.

Care must be taken in certain instances to distinguish epistaxis escaping posteriorly from hæmoptysis; and also from hæmatemesis, which it may simulate by having been swallowed in sleep, and then subsequently ejected by vomiting. In like manner the blood of epistaxis, if swallowed and not vomited, may simulate hemorrhage from the bowel.

The bleeding from the nose is usually confined to one of the nostrils, a hemorrhage from both being uncommon. As a usual thing it is not very profuse, and soon ceases spontaneously; but it sometimes lasts for hours, in exceptional cases for days, and it may at once from its copiousness, or gradually from its continuance, induce fainting, or even terminate fatally. Cases have been narrated in which epistaxis appeared periodically, returning at the same hour every day, like the paroxysm of an intermittent, and, like it, amenable to the influence of quinine. Spontaneous cessation is due to the formation of a coagulum, just as when excessive bleeding is stopped by the tampon; and if the coagulum is dislodged too early by sneezing, coughing, or using the handkerchief, the epistaxis is very likely to reoccur.

Treatment of Epistaxis.—When epistaxis occurs as a physiological or salutary process, it usually subsides spontaneously. When so profuse as to threaten serious injury, it is necessary to resort to mechanical measures to restrain the hemorrhage. In cases where it occurs frequently, or recurs several times a day for weeks at a time, we resort, in addition, to the internal administration of astringents, and other remedies which tend to contract the blood-vessels.

The local action of cold applied to the parts affected, or to the neighboring parts, constringes the vessels and favors the formation of a clot. For this purpose we use cold water, or ice compresses, upon the nose, the forehead, or the neck. The well-known remedy of placing a street-door key upon the skin of the back acts somewhat on this principle, although some of the influence of this and similar remedies is doubtless attributable to the reflex action of the cold upon the vaso-motor system of nerves.

We can sometimes stop the bleeding mechanically by simple pressure upon the nostril, maintained during several minutes; the bleeding is very often from the artery of the septum, which can be readily compressed in this manner. The amount of blood passing to the bleeding vessels can sometimes be reduced by raising both arms above the head, and thus favoring the formation of a clot, forcing the blood reaching these parts to mount against gravity, and thus lessen the force upon the bleeding vessels. An excellent plan, acting upon a combination of these two processes, was introduced by Dr. Negrier,[1] which consists in compressing the bleeding nostril by the finger of the opposite hand, and raising the arm of the affected side high above the head.

Dr. Chapman employs his water-bag between the shoulders, the water being at a temperature of 105°. This acts upon the principle of calling a larger portion of the blood to a distant surface. For the same purpose mustard has been applied over the stomach, or upon the ankles. Junod resorts to his famous boot, which produces an extensive dry cupping of the leg. Others confine the blood in one of the extremities by compressing the limb above the knee, or above the elbow, with a ligature.

When simple mechanical measures or the local application of cold fails to restrain the hemorrhage, we must resort to the local application of mineral or vegetable astringents. These may be injected into the parts, in solution or in powder; or they may be applied by means of pledgets of lint or sponge soaked in the solution, or sprinkled over with the powder. The materials employed are the ordinary astringents and hæmostatics, such as solutions of alum, sulphate of zinc, acetate of lead, sulphate of iron, etc., or solutions of tannic or gallic acid, decoctions of Krameria, etc.

---

[1] *Arch. Gén. de Méd.*, June, 1842, p. 168.

When internal remedies are necessary to prevent the recurrence of bleeding we select the direct hæmostatics, and other articles of the materia medica which produce contraction of the small arteries. Thus we administer tincture of the chloride of iron, ergot in tincture or in fluid extract, turpentine, bromide of potassium, belladonna, and so on. These remedies are given at frequent intervals, and in small doses.

When the epistaxis is distinctly periodic in character, we employ quinine.

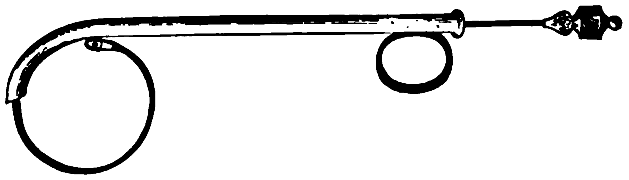
During this time, rest of body and of mind must be enjoined, with the maintenance of the recumbent or sitting posture, avoiding such movements as bring the head forwards, removing all constrictions of the clothing about the neck, chest, and abdomen; and refraining as much as possible from loud talking, coughing, sneezing, snuffling, and the use of the pocket-handkerchief. The food taken should not be stimulating, nor too warm; and when all disposition to epistaxis has ceased for the time, a somewhat similar, though less rigid regimen, should be kept up for some time, care being taken to promote the due action of the skin, kidneys, and bowels.

Where there exists local disease or injury as the cause of the epistaxis, these conditions demand prompt attention.

When the epistaxis cannot be restrained by ordinary means, or where it is very copious, resort must be had to the tampon for the purpose of plugging up the passages, and thus favoring the formation of a clot. Plugging the nostrils anteriorly is easily enough done, but occluding the nares posteriorly is a much more difficult procedure. When no special instrument for this purpose is at hand, a doubled wire, an eyed catheter or probe, or a substitute made of whalebone, is passed along the floor of the nose into the pharynx, whence it is drawn into the mouth by the finger. A stout thread, which has been secured to a small roll of lint or a piece of sponge, is now attached to the eye of the catheter or the loop of the wire, and as the latter is withdrawn from the nostril it carries the thread of the tampon with it, and, as the thread is drawn upon, the passage of the tampon behind the palate and against the orifice of the nares is assisted by the forefinger of the operator.

The best instrument for accomplishing this purpose is the canula of Bellocq (Fig. 48). It consists of a metallic tube, which is to be passed through the nostril into the pharynx; a rod on the exterior, when pressed upon, forces a steel spring into the mouth; to this steel spring a perforated knob is soldered, affording a means of attachment for the thread which is to carry the tampon against the posterior nares.

FIG. 48.



Canula of Bellocq for Plugging Posterior Nares.

The plugs should be removed after the lapse of forty-eight hours, and the nostrils well cleansed by means of the syringe; and if there is any return of hemorrhage, fresh tampons can be applied. Prof. Gross mentions, in his *System of Surgery*, that he has seen several cases terminate fatally, with low fever and delirium, from systemic poisoning produced by too long a retention of the plugs.

NASAL ABSCESS.

Abscess of the interior of the nose is not a common affection, yet is one occasionally met with, sometimes as a result of traumatic injury, and sometimes in the course of a common chronic coryza. Once in a while abscesses are seen without any apparent cause of origin, except perhaps exposure to a sudden change of temperature from heat to cold, or from cold to heat, and sometimes without even that cause.

These abscesses are formed in the submucous connective tissue.

They usually affect the lower portion of the nasal cavity, principally the septum, and not far from the external orifice. Sometimes they are very small and circumscribed, looking like little boils. Sometimes they are very large, large enough to occlude the nostril of the affected side, and to press the septum over towards the opposite side.

The abscess is usually acute, the inflammation sometimes affecting the submucous cellular tissue primarily, and sometimes secondarily as a result of inflammation of the cartilage of the septum. There is redness with turgescence of the adjacent mucous membrane, swelling, increased secretion, and intense pain. Sometimes the entire nose is swollen, red, and painful, this condition occasionally extending over more or less of the skin of the face, which may even become œdematous.

Febrile symptoms are present in severe cases, and are proportionate to the violence of the local action.

The affection, left to itself, subsides in a few days by a spontaneous rupture of the abscess; but it is a better practice to open it artificially at an early date. The after-treatment would consist in the local application of warm water injections, impregnated, if need be, with narcotic or astringent ingredients. If the surrounding inflammation is severe, a leech, confined in a tube which will not let his body escape through the orifice, may be applied within the nostril with relief.

CORYZA.

Coryza is an acute catarrhal inflammation of the mucous membrane lining the nasal cavities. It is popularly known as a cold in the head, and has been called rhinitis, rhinorrhœa, gravedo, etc., by some authors.

The inflammation is often confined to a single nostril, but usually affects both, and often extends to the mucous lining of the maxillary sinus, the frontal sinus, the lachrymal duct, or the Eustachian tube, sometimes involving several of these structures, or all of them, at the same time. There are redness and swelling of the mucous membrane, attended at first with dryness, but subsequently with a more or less copious secretion, which varies in quality at different stages of the affection. In exceptional cases the inflammation is attended with the exudation of a fibrinous secretion, which concretes in the form of a membranous layer, similar in some respects to that of diphtheria, but altogether different in character. This membranous variety is encountered more frequently in the coryza of the new-born infant, and in the coryza attending the exanthemata.

The general symptoms vary, from the merest consciousness of disturbance to the condition of severe pain, fever, loss of appetite, headache, insomnia, mental and physical debility, etc. The earliest symptoms are a sense of dryness and irritation in the nose, exciting the disposition to sneeze, which relieves the uneasy sensation for the moment. After more or less continuance of these symptoms, a sense of fulness in the parts will be experienced, with some difficulty in nasal respiration, often amounting to complete obstruction, so that the mouth must be kept partially open to insure freedom of breathing. With this there soon occurs an obtuseness in the sense of smell, and so much of that of taste as is dependent on the sense of smell. The voice will assume the peculiar nasal tone it acquires when one voluntarily closes the nostrils in speaking. There will be more or less pain in the parts, extending to the frontal and malar regions in proportion as the sinuses in these situations become involved in the inflammation. The pain in these regions is often extremely severe and hard to bear. If the lachrymal duct is involved there will be pain in that locality, with pain of the injected conjunctiva on pressure or exposure to light, attended sometimes with other local optic phenomena. If the inflammation has extended to the Eustachian tube, there will be pain in the region of the ears, with abnormal auditory sounds, and more or less dulness of hearing. If the inflammation travels down the pharynx, we shall have sore throat; and if it attacks the upper air-passages, as not unfrequently happens, we shall have added the symptoms of catarrhal laryngitis, or of bronchitis, or both.

The amount of fever will be greater, the greater the extent of tissue involved. Sometimes this tissue is not confined to the respiratory tract by any means, but the whole body will feel sore and out of sorts, the joints and limbs responding as to an attack of sub-acute rheumatism.

The sense of fulness or stuffing of the parts is very uncomfortable, and futile efforts to expel matters from the nostrils are made during the early stage of the affection, when the mucous membrane is dry; and these efforts become more frequent, and of course more effective, after the establishment of the stage of secretion. The cause of the dryness of the mucous membrane in the earlier stage of coryza is not well understood. In the healthy state the mucous membrane of the nose does not secrete mucus, or even serum. Many individuals have no occasion at all to use the handkerchief for the removal of any nasal secretion, unless it be excited by the inspiration of dust, irritating vapors, etc. The membrane is constantly moist, it is true, but it is not so by reason of any secretion, but in consequence of an absorption of the moisture condensed upon it from the breath of expiration. When the membrane is chilled by the cold, be this by its inherent properties, or by the influence of the terminal fibrillæ of the nervous system, the mucous membrane no longer absorbs this halitus of the breath, and a portion of this moisture accumulates for a while in the tissue of the mucous membrane or just beneath it, giving rise to the sense of puffiness or fulness so familiar to all who have suffered from this complaint. After a while these tissues become saturated and will take up no more fluid, and a process of exosmosis is set up by which the watery constituents of the fluids coursing in its tissue are directed towards the surface, and drip from the nostrils, constituting the characteristic discharge of coryza, which is at first mere water, the exhalation of the moisture in the expired breath. When this exhalation is exhausted, the water is derived from the contents of the blood-vessels, and then we find the secretion to contain some of the saline constituents of the blood. These saline particles irritate the inflamed mucous membrane, and finally excoriate its surface, as well as the surface of the skin of the nostrils and upper lip in some instances, and keep up a disposition to sneeze, and a necessity for the frequent use of the handkerchief, the mechanical effect of which, as well as the irritating nature of the secretion, inflames the exterior of the nose and the cheeks, as well as the margins of the nostrils and the surface of the lip.

At a later stage of the complaint, mucus appears in the secretion, and finally more or less pus; and the secretion is thickened, whitish, yellowish, or greenish in color, according to the intensity of the inflammatory action; being often attended by a faint, unpleasant odor, which sometimes increases to absolute fetor. The entire secretion is not always discharged. Portions concrete into crusts, which are removed by the handkerchief, by the finger-nail, or by hawking and nasal screatus.

The usual duration of an attack of acute coryza is from four to seven days; occasionally it lasts but two or three days; sometimes it continues a fortnight, a month, or even longer; a fresh attack seeming to supervene upon one which is about subsiding. In some instances these attacks follow after each other, with intervals of complete subsidence of two or three days' duration. Sometimes one side is attacked after the disease has subsided upon the other; and there may be a protracted alternation of this kind.

The usual termination of an attack of acute coryza is by resolution, rarely by suppuration. Sometimes it declines into the chronic form of the complaint, though this is more frequently a result of repeated attacks in more or less rapid succession. Sometimes it leaves a permanent obstruction in the lachrymal duct; sometimes a permanent obstruction in the Eustachian tube; sometimes a permanent obstruction of the passage into the frontal or maxillary sinus, leading to chronic diseases of these parts, which may eventuate in caries, in dropsy, in abscess, in the production of a morbid growth. Not infrequently it seems to be the starting-point for the production of nasal polyps.

The principal cause of ordinary coryza is sudden exposure to cold when over-heated, or exposure to undue heat when the body has become chilled. Sometimes it is due to the inhalation of irritating dust and vapors to which the subjects are exposed, either accidentally or in the course of their ordinary avocations.

It is not contagious, though it has sometimes been thought to be so; but experiments have been made by various observers who have placed the secretions of coryza in contact with their own pituitary membrane without any induction of the affection.

Some children seem to be subject to catarrh of the nasal passages, chronic in character, from their very birth, and often involving the bronchiæ simultaneously, or shortly after; so that it may almost be said that they are born with a chronic coryza. Accessions occur, attended with profuse secretion from the mucous membranes; the nose becomes stopped up, and the patient breathes with the mouth open. There is snoring, but no dyspnœa. The disease is sometimes fatal. Politzer mentions a case which led by its long duration to an arrest in the development of the thorax.

The syphilitic coryza of children has been alluded to incidentally in the article on syphilitic sore throats in infants.

A case of coryza can often be aborted, if appropriate treatment for that purpose be instituted within the first twelve or twenty-four hours of the attack. A moderately large dose of opium or of alcohol, sufficient to excite the stimulant properties of the drug, inducing sleep, but falling short of narcotism, will often put an end to the affection at once. Such a dose would be, on an average, from a grain to a grain and a half of opium, or its equivalent in solution, or from one-fourth to one-third of a grain of a salt of morphia, preferably, perhaps, the muriate. The alcoholic dose would depend much on the habits of the individual. For one unaccustomed to liquor, a wineglassful of good whiskey or brandy in a gobletful of warm water, with a small slice of lemon-peel, and made palatable with sugar dissolved in the water before the addition of the alcohol, will usually answer the purpose. These doses should be taken on going to bed, just before which time it may be well to place the feet and legs for a few moments in a hot bath made somewhat stimulating by the introduction of a handful or two of ground mustard. If the disease has come on towards the middle or latter part of the day, one or other of these plans will prove successful in very many instances. Other remedies recommended in a similar manner are: carbonate of ammonia, 10 grs. at bed-time; muriate of ammonia, 20 to 30 grs. at bed-time;

guaiac in tincture, a drachm or so in a wineglassful of warm milk. The inhalation of chloroform to the induction of anæsthesia, administered after the patient has been put into bed, will often be found adequate to abort a cold by its relaxing influence upon the structures, which are in a state of tension. Personal experience has proven the value of this remedy in a number of instances, especially in such as were thought too far advanced to promise success in the abortive treatment by opium or alcohol. But while the use of the anæsthetic is acknowledged to be efficient for the purpose, the responsibility of a resort to it must rest upon the physician prescribing it. It is, in some respects, a dangerous remedy, and one to be employed in skilful and careful hands only; and therefore not to be generally recommended. But such happy effects have followed its use in the author's hands in some cases attended by intense pain and tension in the frontal and maxillary region, and presenting distressful obstruction to breathing, that an acknowledgment of its value is not to be withheld. The cases alluded to would have required larger doses of narcotics to control their symptoms than it was deemed desirable to prescribe; and the fact was remembered that the administration of chloroform for the relief of pain already existing, is by no means attended with anything like the same danger as when it is given for the prevention of pain. An examination into the statistics of deaths from chloroform will show that this result rarely happens when it is judicially administered for the relief of pain, as in neuralgia, parturition, and operations begun without resort to anæsthesia.

When the cold has existed all day, or has existed for twenty-four hours, it cannot be so readily aborted. But it can often still be brought to a very rapid conclusion by producing a state of diaphoresis. This may be done by the administration of diaphoretic medicines, such as the Dover's powder, nitrate of potassa, and the like, assisted by the copious use of warm drinks, which may be slightly medicated in the form of weak infusions of chamomile, eupatorium, hops, and the like. But a very excellent plan, and one which has borne the test of personal experience, is the use of a warm air bath. This is produced by placing burning alcohol, either in a large lamp or in a saucer, under a chair occupied by the patient, whose naked body should be enveloped, from the neck downwards, in a blanket reaching nearly to the floor; the feet being covered with woollen stockings. The warm air confined to the body induces a copious perspiration of the skin, and when this has continued as long as may be desirable, ten or fifteen minutes being long enough as a rule, the patient is put to bed without removing his blanket. The action of the skin continues, and excites thirst, which may be freely relieved by copious draughts of water, a pitcherful of which had better be placed at the bed-side for that purpose. Finally a deep sweet sleep sets in, and the patient awakes in the morning well. He should keep his bed till towards the middle of the day, and be exceedingly careful against exposure to cold, which will be very apt to bring on a return of the complaint.

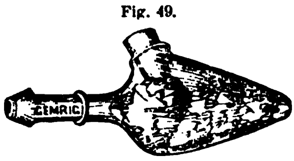
Where there is little or no general distress, but merely a stuffed feeling in the nose. the inhalation of the vapor of iodine, kept up more or less continuously for two or three hours, will often suffice to cure the cold in that time. The best plan is to place two or three crystals of pure iodine in a tube, and for this purpose a quill will answer, and to keep this iodine in the centre of the tube by means of a light cotton wad on both sides of it. The tube is held in the hand, and one end of it is placed in the nostril; the warmth of the hand disengages the vapor, which is snuffed up from time to time; when the vapor irritates too much, the tube is withdrawn for a few moments and then re-inserted. In this way the inhalation is alternated between the two nostrils, if both be affected, the patient placing himself in any convenient position, recumbent or semi-recumbent, and, if he likes, whiling the time by perusing an entertaining book. The iodine induces the flow of serum, which relieves the distention, and probably exerts some beneficial action upon the nerves of the affected membrane.

Camphor, or camphor and iodine, used in the same way, has been found useful; as also the use of the muriate of ammonia, either produced in the nascent state from muriatic acid and strong liquor-ammonia, or from the fumes of heated sal-ammoniac.

The fumes of burning opium have often been employed successfully to abort or abate a cold in the head.

An ingenious instrument, devised by Dr. Buttles, of New York, for the inhalation or propulsion of vapors into the nostrils, is shown in Fig. 49. It consists of a glass receiver, into which a sponge or cotton wad is placed, saturated with the material from which the vapor is to be produced. The pointed extremity is placed into the nostril, and the vapor simply inhaled, or else propelled by passing a current of air through a tube attached to the nozzle.

Fig. 49.



Buttles' Nasal Inhaler.

When the coryza has become fully established, we resort to the use of warm aromatic drinks, warm foot-baths, and other methods of maintaining a gentle condition of diaphoresis until the affection is at its height, when it gradually subsides, and the employment of remedies is no longer indicated. If there are severe general symptoms of fever, pain, and sleeplessness, these are combated by antiphlogistics, anodynes, and hypnotics.

IDIOSYNCRATIC CORYZA.

Hay asthma is one, and hay-fever another of the principal terms used to designate a peculiar form of periodical coryza to which certain people are subject. It is usually produced by inhalation of the pollen of certain grasses or flowers, and is due to a peculiar idiosyncrasy of the individual affected. It is analogous to the cold in the head produced in some people by the proximity of powdered ipecacuanha. It is usually produced by the hay made from the early grasses. It is sometimes produced by the emanation from the rose. I know one individual in this city, an old gentleman, in whom an exceedingly distressing attack of coryza, with swelling of the nostrils, lips, and face, lasting for several days, is produced by the powder of the chamomile flower. Persons thus affected periodically in this way can almost always antedate the onset of the expected attack with a wonderful accuracy, which cannot be altogether explained by reference to the ostensible cause. Sometimes the nostrils chiefly are affected, and sometimes the entire bronchial tract also. The affection usually lasts for several weeks, but can often be arrested or prevented by a change of locality. Quite recently, that is to say, within two or three years, it occurred to Prof. Helmholz, who had long been subject to this hay fever, to examine the secretions from his nostrils, and he discovered that they contained vibriones. He used a weak solution of the muriate of quinia (1 part to 100) by injection with relief, and was enabled to prevent the attack the year following by resorting to this local treatment before the usual date of its occurrence.

A similar affection is sometimes produced by emanations from animal as well as from vegetable matters. Dr. H. Charlton Bastian has recently restated[1] that he has had frequent personal experience of the fact that a spasmodic and catarrhal affection, somewhat resembling hay-fever, may be produced by emanations from certain nematoid worms, even after they had been preserved for two or three years in spirits of wine, and macerated for a time in calcic chloride.

The treatment of an attack of idiosyncratic coryza would not differ from that of the ordinary form of the affection except in temporary change of locality, or the local use of some agent calculated to destroy the vegetable emanations which give rise to the disease. For the latter purpose, carbolic acid and sulphurous acid may be employed, or the injection of quinine, as in the case above mentioned. A liberal regimen and vegetable tonics are often indicated.

Some persons lose their susceptibility to this affection with advancing age, but I have been consulted in one case where it has continued regularly in a patient nearly ninety years old.

INFLUENZA.

Influenza is the name given to an epidemic febrile catarrh which occurs from time to time, at irregular intervals. When ordinary coryza is more prevalent than usual, the term influenza is often applied to it, but incorrectly. The epidemic usually lasts about six weeks, and sometimes attacks almost the entire population of the district, especially those exposed to the inclemencies of the weather.

---

[1] Introductory Address; *Brit. Med. Jour.*, Oct. 7, 1871, p. 404, note.

The following account of the affection is taken from the concluding remarks in Dr. Theophilus Thompson's "Annals of Influenza."[1]

"One of the most remarkable circumstances impressed on our notice, is the great similarity of symptoms presented by the disease in its different visitations, notwithstanding every diversity of season and place. The complaint usually commences like a feverish attack, with a feeling of chilliness and sensation as of cold water running down the back, weariness and stiffness of the limbs, and pains in the neck, back, and loins, more intense than those which attend the common forms of fever. In the more severe cases there is decided rigor, alternating with heat and flushing of the skin; the fever has an exacerbation every evening, and lasts from two to fourteen days. Pain is often felt over the frontal sinuses and cheek bones, or behind the sternum; the eyes are suffused; there is sneezing, tingling, and an acrid discharge from the nostrils; a short, frequent, harassing cough; a feeling of constriction of the chest and throat, and not unfrequently soreness, redness, and tenderness of the fauces. The inflammation of the tonsils is occasionally intermittent. The expectoration, at first scanty and difficult, consisting of thick viscid mucus, usually devoid of air-bubbles, subsequently becomes opaque, copious, and muco-purulent. Sonorous, mucous, and sibilous ronchi may be detected by auscultation; and there is frequently partial crepitation, which is most apt to occur at the lower portion of the lungs. The circulating system is depressed, the pulse being usually feeble, soft, and quick in the early stages; in the decline of the disease, slow, and sometimes intermitting. The appetite is impaired, and the taste perverted; nausea and vomiting are often present; the tongue white and moist, covered with a creamy mucus, or loaded with a coating of moist yellowish fur, and presenting elevated papillæ of a peculiar vivid, red color at the edges. In some cases it is, however, little affected. In most instances the urine is scanty and high-colored, soon becoming thick and reddish, or assuming a whey-like appearance, and depositing a copious pink or whitish sediment. The depression of strength is extreme, occasionally resembling the collapse of cholera; the usual energies are subdued, and agonizing fears of death are sometimes present. The skin, at first hot and dry, soon becomes perspiring, and often exhales a peculiar flat, musty smell; sometimes it assumes a bluish hue. When the lungs are not materially affected, the force of the morbid influence is in some instances directed to the bowels, producing pain and tenderness of abdomen, and diarrhœa, with mucous or dysenteric evacuations; at other times, the brain being chiefly involved, vertigo, sleeplessness, and delirium are prominent symptoms.

---

[1] **Annals of Influenza, or Epidemic Catarrhal Fever in Great Britain, from 1510 to 1837. Sydenham So. Pub. London, 1852.**

"In very old and debilitated subjects, the disorder often presents the character of suffocative catarrh. Amongst the most characteristic phenomena may be mentioned the persistence of cough and debility, long after the cessation of the other symptoms.

"The most frequent and important complications are: inflammation of the bronchial tubes, lungs, pleura, or of the brain and its membranes; acute articular rheumatism; neuralgia; and cutaneous eruptions; the nature of the complication depending on constitutional peculiarities, or on exposure to the exciting causes of the associated diseased action, about the time of the onset of the attack of influenza. The principal varieties of the complaint may be divided into—1st. The cerebral; characterized by vertigo, delirium, erysipelatous eruption on the face, sometimes swelling of the parotid glands. 2dly. Guttural; attended with cynanche tonsillaris. 3dly. Bronchial; with difficult, oppressed respiration. 4thly. Intestinal; with diarrhœa, mucous evacuation, and, in some examples, tenderness of abdomen. 5thly. Typhoid. This form, which rarely occurs except among the poor and badly nourished, is characterized by depression of pulse, extreme prostration of strength, and other symptoms of putrid or adynamic fever. Almost every visitation of influenza, although characterized by the predominance of some one variety, generally presents examples of each, besides in some instances exhibiting phenomena peculiar to itself."

"Nothing can more forcibly prove the definite character of the influence which produces the disease, than the similarity of the symptoms during several centuries, and under such different degrees of civilization."

The treatment for influenza would consist essentially in that adopted for ordinary fully formed coryza, with the addition of tonic and supporting measures. There is here a blood poison at work, probably, as suggested by the late Prof. J. K. Mitchell of Philadelphia, of cryptogamic origin; and therefore the direct employment of such remedies as are inimical to these organizations is indicated. The sulphites and the bisulphites, or the hyposulphites of soda, lime, or ammonia may be employed internally with this view; and the inhalation through nose and bronchi of the dilute sulphurous acid water would also act beneficially. There is some evidence that this view is correct, in that the maintenance of an equable temperature, kept up in the Masschusetts General Hospital during an epidemic at Boston, did not secure any immunity from the affection for the inmates in their wards; and hence it is fair to infer that the malady is due to extraneous matters in the atmosphere. On this view, the treatment above indicated ought to be successful. The various complications should be met on general principles, care being taken, in combating evidences of inflammation, not to resort too hastily to depletion, especially by venesection; and to be equally cautious about other depressing remedies, inasmuch as the disease is of that tendency which we call typhoid.

Quinine or bark in large doses would be indicated as a tonic, and distilled liquors and carbonate of ammonia as stimulants. I should think, in bronchial complications especially, that carbonate of ammonia in ten or fifteen grain doses, protected by some bland mucilage, repeated every two or three hours, or oftener, would be of great utility.

Mild cases would not require any special treatment other than that adopted for coryza of equal severity; but the inhalation of sulphurous acid water and its injection into the nostrils would be no more amiss than in the management of the severer cases.

Not only are human beings subject to attacks of influenza, but the lower animals also suffer from its epidemic influence.

Influenza, when fatal, is usually so on account of the pulmonary or cerebral complications. It is said often to leave debility, nervous prostration, and a susceptibility to phthisis, in those predisposed to it. Dr. C. Hanfield Jones mentions[1] a case in which cerebral paresis was occasioned by influenza.

An excellent article[2] on the subject of influenza, prepared chiefly from notes of cases which came under his own care a few years ago, has been written by Dr. Jas. J. Levick, of Philadelphia.

CHRONIC CORYZA.

Chronic coryza, chronic nasal catarrh, chronic rhinorrhœa, as it has been variously called, is usually accompanied with an hypertrophic thickening of the mucous membrane covering the turbinated bones, especially the lower ones,—a condition which is readily recognized on examination anteriorly with the speculum. Sometimes the mucous membrane of the alæ is in a similar condition, producing circumscribed protrusions of a red color, which are liable to be mistaken for fibroid or other growths. Sometimes the protrusions are due to obstructions of the orifices of the glands of the nasal mucous membrane. The accumulation of secretion pushes the mucous membrane before it, until finally a sort of exterior pocket is formed, with contents of greater or less consistency. These are usually elastic to the touch, but are sometimes quite hard from induration. The parts usually bleed freely on injury, but the bleeding is easily arrested. In addition to this physical condition of the mucous membrane, we occasionally find polypous or warty excrescences here and there, not infrequently upon the posterior portion of the floor of the nostril.

The symptoms of chronic coryza are those of frequent or permanent obstruction of the nasal passages, with a more or less copious secretion of a mucous or muco-purulent character, discharged from the passages posteriorly as well as anteriorly. This obstruction is usually greater in damp than in dry weather; and not infrequently we find that either one passage or the other is nearly wholly impervious to the air, there being no regularity with respect to the nostril affected. The relaxed mucous membrane absorbs the moisture from the atmosphere, and in this way tends to occlude the passage.

---

[1] Studies on Nervous Functional Disorders. London, 1870.

[2] Remarks on the Epidemic Influenza of 1861 and of 1863, with notices of some malignant forms of the disease. *Am. Jour. Med. Sci.* 1864, p. 65.

In simple cases, uncomplicated with fetor of the secretions, there is rarely any ulceration, or even abrasion, of the mucous membrane; but in severe cases this condition prevails. It is described under the head of Ozœna.

The affection sometimes appears as a result of repeated attacks of acute coryza, but more frequently seems to have commenced in a slow manner, chronic, as it were, from the outset. When seen by the practitioner it has usually existed a number of months, or a number of years, sometimes having included almost the entire life of the patient.

The subjects of this affection are preëminently those of scrofulous diathesis, or those afflicted with hereditary syphilis.

The treatment of chronic coryza is similar to that to be described for the milder cases of ozœna. Care must be taken that good hygienic regulations be observed, as regards food, diet, clothing, cleanliness, and exposure.

Where there is merely thickening or induration of the nasal mucous membrane, much benefit can often be procured from the local application of the mineral astringents, or of nitrate of silver, carbolic acid, etc. Where the membrane is much relaxed, or protruding into the cavity of the nostril, the best plan is to twist it off with forceps, a very painful proceeding; or to encircle it with a wire snare, similar to that used for removal of aural polyps, and to cut it off by drawing the loop tight, a proceeding much less painful. To secure the action of the wire, the membrane may be drawn through it with a pair of delicate forceps. The resulting sores may be touched with the nitrate of silver. As the edges of these wounds contract in cicatrization, the free space of the nasal passages is increased. Many operations are usually required to free the nasal cavities from these folds of mucous membrane. In cases of exceeding obstinacy, and which cannot be cured in this way, freedom of nasal respiration may be secured by the introduction of silver tubes through the nostrils, connected in front, so as to prevent their falling into the pharynx. These may be worn every night, to keep the nostrils patulous, and to promote retraction of tissue by the compression they exercise.

When the presence of polyps is the cause of the coryza, their removal is essential to a cure.

The habitual use of the nasal douche, followed by the injection of astringent solutions, will be of great service to the patient, and, if persisted in, often prevent any aggravation of the affection. Occasionally it will be adequate to a cure.

A chronic discharge from the nostril may occur from reflex irritation elsewhere. Thus a case is related[1] by Mr. Fleischmann, of Wrexham, of a little girl, five years of age, troubled for three months with a constant discharge from the nostril, slightly purulent, but not profuse. The mucous membrane, as far as it could be examined, was healthy, and there were no indications of any morbid growth. She was ordered a strong injection of gallic acid, and took concurrently small doses of the sesquichloride of iron. The only advantage she derived was, that the discharge lost its purulent character. In amount it remained the same, though the treatment was long persevered in, and other astringents tried. Some undiscovered local irritation was suspected. As nothing could be found wrong in the nasal passages, the condition of the teeth was examined, and as there was caries of the upper canine tooth of the same side as the affected nostril, it was removed. The discharge was much lessened on the next day, and, in the course of a day or two, disappeared altogether.

OZŒNA.

Ozœna is a term which is used to designate any chronic discharge, of a fetid character, from the nasal passages. A discharge of this kind may attend several different conditions, and the term, therefore, is merely denotive of a characteristic symptom. Ozœna is present in ulcerations of the mucous membrane of the nasal passages, and of the sinuses communicating with them, whether the result of what is called the strumous or scrofulous diathesis, or whether the result of syphilitic ulceration, or of that ulceration dependent upon lupus.

---

[1] (*Brit. Med. Jour.*, Apl. 9, 1859.) *Am. Jour. Med. Sci.*, July, 1859, p. 236.

Sometimes, however, we meet with a case of chronic disease of the nasal passages unattended by any evidence of dyscrasia whatever. The bones and cartilages, as far as their condition can be determined, are healthy, and there may not be any ulceration of the mucous membrane visible on inspection, either anteriorly or posteriorly. The affection in these cases seems to depend on some constitutional idiosyncrasy, in consequence of which portions of the nasal secretions desiccate, and remain impacted in some of the sinuosities of the nasal passages, and there undergo decomposition. The condition has been compared to that which is attended by peculiar offensiveness of the cutaneous perspiration from the feet and armpits of some persons who, in spite of the most scrupulous ablutions, cannot rid themselves of their unpleasant odor. Be this as it may, there is no doubt that cases of ozœna exist, in which we can find no adequate cause to account for the affection. Individuals thus afflicted are rendered very unhappy by reason of their infirmity, which deters them from seeking the society of their friends, or resorting to places of public gathering; and the affliction is the more severe that the subjects are often in excellent general health, and anxious and willing to take part in domestic and social enjoyments. In these cases the discharge is not always profuse, sometimes it is very scanty; but it exhibits a disposition to desiccate into thin scales or crusts, which are removed with difficulty, sometimes from the nostrils, and sometimes by a sort of inspiratory nasal screatus, which, after repeated efforts, drives them through the posterior nares into the pharynx, whence they are expectorated. These crusts have usually a horrible stench, which is perceptible at a distance of many feet, and may impregnate a large room.

All that can be done effectually in the way of treatment in these cases is to keep up an active condition of the secretory functions of the skin and kidneys, by frequent bathing and the copious drinking of water,—a sort of sewerage, as it were; and to cleanse the parts thoroughly and efficiently several times a day, especially at night and morning; making this act a permanent and essential part of the daily toilet, as much so as the use of the tooth-brush or the wash-basin. The nasal douche of Thudichum, to be presently described, is an admirable apparatus for this purpose; but, if the crusts are hard to remove, the use of the posterior nasal syringe, and of the continuous rubber ball syringe, in such request for ordinary family use, will afford better results; the latter especially in those cases in which crusts moulded to the form of the posterior openings of the nares are apt to accumulate, and which must be dislodged by a stream of some force entering the nostrils from the front. The ordinary solution of common salt, a drachm or two to the pint of tepid water, fulfils the requirements of the douche for cleansing purposes; and the detachment of the crusts is facilitated by the substitution or addition, as may prove most appropriate, of equal quantities of alkalines, such as carbonate or bicarbonate of soda, phosphate of soda, and the like. At least a quart of the solution should be used at each night and morning ablution. After cleansing the parts in this way, a second douche should be used, containing a disinfectant in solution. For this purpose we may employ the permanganate of potassa, chlorinated soda, carbolic acid, and so on, which will in great measure control the fetid character of the secretions. Various applications are made at times for the purpose of altering the condition of the mucous membrane. These are preparations of the bichloride of mercury, iodine, the terebinthinates, muriate of ammonia, etc., in the form of powder, solution, or vapor; though, in my own hands, they have proved of very questionable benefit. Local cleansing, with disinfectant detergent douches, and the maintenance of the cutaneous and urinary secretions by appropriate remedies, have done good service; but their use must be constant.

There is a form of ozœna, attended with certain local manifestations, which is ingrafted upon the strumous diathesis; and which from its persistence, and from its ultimate effects, which, when very severe and improperly attended to, resemble so much the effects of the analogous conditions in constitutional syphilis, seems to lend great force to the doctrine so forcibly taught in some of our schools, that scrofula is but a modification of inherited syphilis, bearing, perhaps, a relationship to that protean diathesis somewhat similar to that which varicella bears to small-pox.

These cases can usually be traced to a commencement in coryza or catarrh, the result of exposure to cold. The catarrh becomes chronic, the discharge more or less profuse, varying in color and appearance, being now muco-purulent, then purulent, sometimes sanguinolent. The discharge itself is exceedingly offensive in odor, but there is, in addition, a permanently unpleasant odor about the breath, so that propinquity to the individual is rendered very disagreeable. The affection may make its appearance at any age, but is usually noticed for the first time about the period of the second dentition. The subjects which I have myself seen have been principally young girls from six or eight years of age upwards to the period of confirmed puberty, or early adult life. In these cases, crusts of inspissated mucus accumulate at the entrance of the posterior nares, from detention there of the secretions, and they often become moulded to the form of the opening, and when discharged present a peculiar honey-comb appearance. These moulds are usually several days concreting, and the patient will perhaps discharge them once or twice a week,—sometimes oftener, sometimes less frequently. Under the latter circumstance, small dense clumps of irregular formation will be occasionally drawn into the throat by forced nasal inspiration, and then spit out. These will possess the characteristic odor. Sometimes small cheesy-like concretions will be discharged, apparently from the glandular tissue at the nasal portion of the pharyngeal vault, similar to the matter occasionally discharged from the tonsils, and, like them, of an intolerable stench when crushed. There will be considerable pain in the parts, which will be apt to be particularly severe in the region of the frontal sinuses.

The affection is met with in all classes of society; in the robust individual no less than in the delicate one; in those that are tenderly reared, and in those who are allowed to "rough it."

If, after thorough cleansing with the douche, the parts are carefully examined, anteriorly by the nasal forceps or dilating speculum, and posteriorly by the rhinoscope, there will usually be discovered some points of ulceration of the mucous membrane, superfical or deep-seated. These ulcerated spots may occupy the free surface of the turbinated bones, or the lower region of the septum; and when they cannot be found in these situations, it is fair to infer that they must exist upon some portions of the turbinated bones altogether out of the field of vision. The mucous membrane of the nose in these instances will be swollen so that the opposite surfaces of the cavity meet at one or more points, and there will also be sometimes found that puffy appearance of the mucous membrane covering the inner surfaces of the septum, elsewhere described as being present in other chronic affections of the posterior nasal region. The swelling of the mucous membrane may be due in most instances to an infiltration of the sub-mucous tissue, but in some instances there seems to be, in addition, a real hypertrophy of this tissue. The parts are usually red, sometimes very sensitive to the touch of the probe, though sometimes not at all so.

If the disease have existed for some years, the ulcerations will have extended beyond the tissue proper of the mucous membrane, and will have involved the cartilages and the bones, portions of which will sometimes have been destroyed, and have been discharged spontaneously; so that the cartilaginous septum is pierced through and through, sometimes by one or two small perforations, but oftener in a single large rounded hole, perhaps admitting the end of the little finger, or a larger one, and looking as if it had been cut out or gouged out. In some instances one of the turbinated bones, principally the middle one, will be bare in its entire extent, or the greater portion of it, and be in a condition of necrosis, demanding its extraction; an operation readily accomplished with the polypus forceps. Sometimes, as mentioned, it has already been removed, and left a large space in the nostril, through which the posterior wall of the pharynx or a portion of the upper surface of the velum can be seen. In some instances the destruction will have proceeded farther and have involved portions of the superior maxillary bone, from which copious accumulations of fetid pus and necrotic particles will have been discharged at intervals. In cases of this kind, an alteration will have taken place in the external configuration of the parts, the nose appearing sunken, fallen in, or flattened out, and the nostrils distended.

In some instances the openings of one or more sinuses will be found, the tracks of which cannot be readily traced, perhaps coursing round the scroll of the turbinated bones, but from which, on pressure, a few drops of thick creamy pus can be seen to exude.

Usually some evidence or other of a strumous taint of the system will be manifest, and this may include every variety of scrofulous disease, from coxalgia to enlarged tonsils.

In cases of undoubted syphilitic origin,—and the distinction between scrofulous and syphilitic ozœna is not always well-marked,—the involvement of the bony structures will progress still further. The palate bones, the sphenoid, the vomer, and the ethmoid, will often undergo more or less destruction; and in some instances rhinoscopic inspection will reveal necrosed spots upon the vomer, the sphenoid, and the basilar process of the occipital bone; a condition further confirmed by contact with the probe. The odor of the discharge in these cases is not as offensive as in the scrofulous cases; but it is equally persistent, and will remain as long as there exists any undischarged dead bone. The tortuous condition of the nasal openings, and the sinuses leading to them, is such as to render it impossible in most instances to remove this dead bone by surgical interference, and thus we are forced to await its discharge bit by bit. The amount of destruction that may occur under these circumstances is enormous. In some instances the cranial vault has been pierced, and meningitis puts an end to the complaint and the patient.

The amount of the discharge, its nature, and the intensity of its odor will vary during the progress of ozœna, whatever may have been its origin. An inflammation of the parts, such as follows a cold, a determination of blood to the head, overwork, the approach of the menstrual period, all seem to increase the offensiveness of the discharge. This will become moderated after cleansing by the douche, and the application of remedies, but will become as bad as ever in a few hours or a few days. When there is involvement of the bone, or a new involvement of the bone, the fetor will be increased until the necrosed portion has become exfoliated and discharged.

The patient, as a usual thing, is cognizant of his unpleasant condition to a certain extent, but is unaware of the full amount of disagreeable odor emitted from his body. This is because the sense of smell is obtunded, in some instances entirely destroyed; and with it, in consequence, there is more or less loss of the sense of taste. In those cases in which the frontal or maxillary sinuses are affected to a greater extent than the nasal passages, he is better able to appreciate his infirmity, for the sense of smell is still conserved to a considerable degree.

The offensiveness of the odor in bad cases is beyond description; it is absolutely sickening, and must be endured to be comprehended. It will impregnate a room for hours, and deter the surgeon from proper efforts to relieve the local condition.

Treatment of Ozœna.—The treatment of ozœna is sufficiently simple in principle, but it is exceedingly tedious and unsatisfactory in practice. Palliation of the severer symptoms can almost always be procured, but a perfect cure often requires months and months of persistent treatment, and in some instances seems almost unattainable, if not quite so. Where the larger bones are diseased, and where it is impossible to get thorough access to them, the condition will last for years and years; dead bone being exfoliated splinter by splinter, and new sources of evil becoming involved as the older ones are undergoing improvement.

Fortunately, in that variety described as depending upon an unfortunate idiosyncrasy, the disease moderates in violence as the patient becomes older, so that in middle-adult life it has subsided entirely or in great measure. In the scrofulous variety we can endeavor to improve the constitution by resort to systemic remedies, such as cod-liver oil, quinine and iron, the preparations of iodine, arsenic, and so on; and we may thus repress any increase of the malady, if we cannot succeed so often in restraining it altogether. The administration of cubebs, preferably, perhaps, in the form of the oleo-resin, in doses of from fifteen to twenty drops or more on sugar, after meals, will sometimes restrain the copiousness of the secretions to a certain extent, and modify their character by the local influence of the drug in its elimination through the bronchial mucous membrane. The decidedly syphilitic cases, when they have not progressed so far as to be altogether irremediable, are much more manageable under systemic medication than the idiopathic or strumous forms. Here, small doses of the bichloride of mercury, with the free use of iodide of potassium, do as good service as they do in other forms of constitutional syphilis, especially if the patient has retained his vigor. If his general health has become much impaired, a course of generous diet, assisted by a tonic treatment, in which the administration of quinine and iron will do good service, will become necessary before any beneficial results can be expected from the specific treatment.

Constitutional treatment, however, though absolutely essential in the management of this condition, is inadequate of itself to a cure. Local treatment seems imperatively demanded in all forms of ozœna.

This consists in the frequent cleansing of the parts, and the assiduous application of local remedies. Without the cleansing, the local remedies are of little avail; they become entangled with the secretions, and cannot have that good effect upon the parts which they exercise when applied upon a clean surface.

The cleansing process is accomplished by the use of the nasal douche, the posterior nasal syringe, and the house syringe applied anteriorly; and with the medicinal articles already enumerated on page 267. This ablution should be attended to as punctually and as conscientiously as the patient attends to his meals, and is on no account to be neglected.

The local applications for remedial purposes consist of solutions, powders, and vapors drawn into the parts by nasal inspiration, or projected upon them by means of appropriate apparatus;—this, as far as applications to the general surface are concerned.

Where ulcerations are seen, and where they can be reached by instruments introduced through the nostrils, or behind the palate, they should be touched by the sponge, or hair-pencil, loaded with a solution of nitrate of silver; sulphate of zinc or of copper; carbolic acid; chromic, nitric, or muriatic acid; or of the acid nitrate of mercury, as the case may seem to demand. Dead bone, where accessible, should be removed by the forceps, assisted, if need be, by the knife or scissors. The opposite surfaces of the membrane, when in contact, should be kept asunder for an hour or more at a time every day, by the interposition of strips of compressed sponge, or tubes of laminaria, which exercise a compression upon the parts as they imbibe moisture from the secretions, and thus favor the absorption of the products of submucous infiltration. Where hypertrophied mucous membrane exists, and where internal compression is insufficient to enlarge the passage for the free ingress and egress of air, and the free discharge of the secretions, it is good practice to twist off portions of the membrane with delicate forceps, so that cicatrization of the edges of the wound may enlarge the passage. The free bleeding which accompanies this proceeding exerts a salutary influence upon the parts; and though the operation is, as may well be imagined, an exceedingly painful one for the patient, it is so efficient in its relief that he will readily undergo the torture, again and again, for the sake of the ease it gives in respiration.

The solutions used, by douche or by injection, may contain chlorate of potassa, alum, creasote or carbolic acid, permanganate of potassa, chloride of lime, or similar articles, which, in addition to their local action, tend to control the fetor. Or we may use injections of nitrate of silver, sulphate of zinc and copper, the sulpho-carbolates of zinc or lime, bichloride or iodide of mercury, chloride of lime, chloride of zinc, and the like. These injections should be preceded by the use of the douche for cleansing the surfaces, and should be employed at least twice a day, and, where practicable, three and even four times a day. They should not be very strong at first—say two grains of the nitrate of silver, or sulphate of copper or zinc, to the ounce of water—and a tepid solution is sometimes better for this purpose than a cold one, to which end, the vial containing the solution can be placed in a warm-water bath while the douche is being used beforehand. If the parts bear the application well, the strength of the solution may be gradually increased to that of thirty and forty grains to the ounce; care being taken not to make too free use of remedies which act promptly on the constitution, inasmuch as it is possible to produce a systemic effect through applications to the nasal membrane, owing to the proximity of the olfactory filaments to the nervous centre.

Indeed, as should have been remarked in connection with the treatment of idiopathic ozœna, we can often relieve the pain in the frontal region, promptly and efficiently, by the application to the nasal passages of an unguent containing but two or three grains of morphia to the ounce, the quantity employed at a time being not more than the volume of a pea. This should be rubbed into a little wad of cotton, which may be stuck by sealing-wax upon the end of a knitting-needle, and passed along the passages as far as the patient can reach, the ointment being gently wiped off upon the parts as thoroughly as possible, and over as great an extent of surface as may be.

The solution of the chloride of lime will be found to do good service in some obstinate forms of ozœna. It was introduced into practice in Philadelphia by the late Professor Horner,[1] whose plan was to inject each nostril with a solution containing a teaspoonful of the chloride of lime in a wineglassful of water. This was repeated twice a day. I do not think this practice is much in use at the present day, but I am sure it ought to be. A formula[2] which I have sometimes used with very satisfactory results, contains from thirty to sixty grains of the chloride of lime to the ounce of a decoction of krameria, of which two or three drachms or more, diluted with an equal quantity of water, is injected into the nostrils by the patient, after the use of the douche night and morning. Sometimes but ten or twenty drops can be employed. When the remedy excoriates the external parts, as it will do sometimes, its use is to be suspended, or its strength reduced, as may seem to be most judicious.

---

[1] *Amer. Jour. Med. Science*, vol. vi., 1830, p. 265.

[2] Dr. Detmold, of Hanover (*Holscher's Annalen*, B. 1804). *Brit. and For. Med. Rev.*, Oct., 1841. *Am. Jour. Med. Science*, Jan., 1842, p. 232.

The use of glycerine as an injection is sometimes of great service, particularly in the ozœna of a scrofulous nature. It is bland and unirritating in its qualities, has a great affinity for moisture of all kinds, and thus assists the removal of the secretions, inspissated crusts, and detached fragments of dead bone.

The addition of iodine to the glycerine, in the proportion of a grain or two to the ounce, is sometimes advantageous.

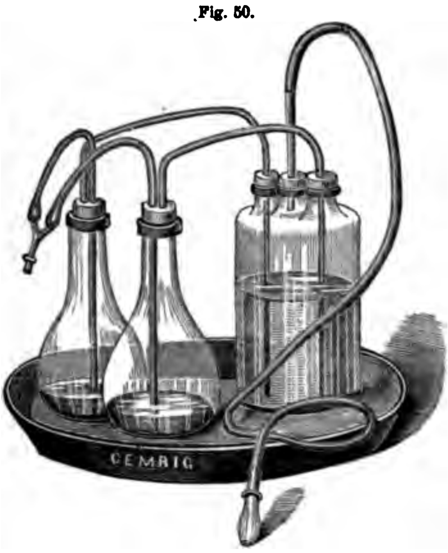
Professor Trousseau relied greatly upon certain medicated powders, of which he directed the patients to snuff up a pinch into the nostrils twice or thrice a day, after having cleansed them as thoroughly as possible. He employed several formulas, the principal of which contained calomel, and the red precipitate mixed with sugar; the former in the proportion of a drachm to the ounce, and the latter in the proportion of forty grains to the ounce, care being taken to regulate their use in accordance with the irritation they produce. Another powder which he employed very frequently, and with great success, was the subnitrate of bismuth, rubbed up with Venetian talc, in equal parts. This was used *ad libitum*, and particularly recommended on account of its innocuousness. Powders containing cubebs, tannin, camphor, and other ingredients are often used; sometimes they are combined with snuff. Since the introduction of the nasal douche into practice, the employment of powders is less frequently resorted to.

In some instances, citrine and other ointments are employed locally, and may be applied by a contrivance similar to that described for applying the anodyne ointment.

The principal remedies used in the form of vapor have been mercurials. Calomel, bisulphide or binoxide of mercury, are evaporated by means of a spirit-lamp, and the fumes are inhaled through the nostrils.

Advantage sometimes accrues, in all forms of chronic coryza and ozœna, from the free use of the vapor of muriate of ammonia, following the cleansing of the parts by the douche. For this purpose the powder of sal-ammoniac may be heated over a flame and the fumes snuffed up. The most elegant method is to use the apparatus of Lewin (Fig. 50) for generating the vapor of muriate of ammonia in a nascent state. The bottoms of two bottles, through the corks of which a tube passes to the bottom, are covered with an ounce or so of strong muriatic acid and strong aqua ammonia, respectively; a second tube, passing from just below the corks of each of these bottles, is carried down to the bottom of a third, or wash-bottle, half filled with water. A third tube from just below the cork of this bottle communicates with a nozzle to be placed in the nostril. Air is forced into the bottles containing the acid and the ammonia, a hand-ball bellows, or an air-press, being used for the purpose; the vapors of ammonia and of muriatic acid are forced into the water of the third bottle, where they unite to form the vapor of muriate of ammonia, which escapes by the nozzle after having been purified by the water.

Fig. 50.



Apparatus for generating nascent muriate of ammonia.

A few of the author's cases are briefly recorded in illustration of the value of the douche of Thudichum.

Ozœna of seven years' duration.—Martha M——, unmarried, aged about 35, had been afflicted with ozœna of the scrofulous variety for several years. There was no evidence of ulceration on examination of the parts, anteriorly or posteriorly. This patient was under treatment from April 28th to June 22d, 1866, at which date she was discharged from professional attendance. The treatment consisted in washing out the parts thoroughly night and morning with lukewarm water containing a tea-spoonful of table salt to the pint, by means of Thudichum's nasal douche; and afterwards applying to the cleansed surfaces a solution of chlorate of potassa by the same apparatus. After the second week a weak solution of sulphate of zinc was substituted for the chlorate of potassa, alternated occasionally with a solution of chlorinated soda, or of permanganate of potassa; and towards the last the chlorinated soda alone was used, in the proportion of one fluid ounce of the officinal solution to half a pint of lukewarm water. The unpleasant symptoms had completely subsided at the end of two months, and the patient was dismissed with instructions to continue the use of the nasal douche with salt and water, as part of her morning ablutions.

Ozœna of several years' standing cured by persistent use of the nasal douche.—Susan C——, about 22 years of age, first seen June 16th, 1866, had an ozœna of several years' standing, following erysipelas. There was total loss of sense of smell, even for the most pungent and aromatic substances. The nose was much altered in shape, and looked like a large rounded nodule of sausage. No signs of ulceration. Five months' persistent use of the nasal douche with astringent and detergent solutions, changed from time to time, completely overcame the affection, with marked diminution in the size of the nose, and return of smell so that she could enjoy her food and distinguish floral odors. I have seen this patient on several occasions since, the last but a few months ago, and there has been no return of the affection, although the use of the douche has been discontinued for nearly five years.

Ozœna of twelve years' duration, attributed to a fall.—Ellen S., June 26th, 1866, æt. 22, of scrofulous diathesis, had a moderately offensive discharge from the nasal passages, which she said followed a fall received twelve years before, and had continued ever since. There was no evidence of deformity of the nasal structures. The discharge ceased under the persistent use of detergents applied by the douche.

Ozœnic discharge of a year's duration following a blow.—Frances K——, æt. 10, in March, 1865, received a blow upon the nose followed by copious hemorrhage. Three days afterwards a whitish discharge came from her nose, which had continued until the time at which I first saw her, July 20, 1866. This discharge was very offensive at times, especially in rainy weather. The child was of strumous diathesis. Ulcerated spots were seen on the internal surfaces of the left ala of the nostrils. The parts were cleansed daily by the douche; and an application made locally of an ointment, composed of one part of the ointment of the nitrate of mercury to five parts of simple cerate. In a few weeks the disease had become entirely controlled.

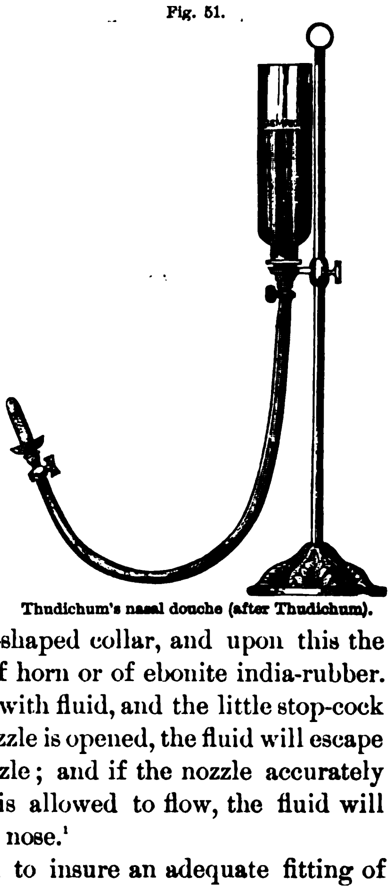
Ozœna of nine years' duration after Scarlatina.—Edward P——, æt. 14, had been greatly relieved when withdrawn from treatment by the daily use of the douche, first with salt and warm water, and followed on each occasion by warm water just tinged pink by a weak solution of permanganate of potassa.

THE NASAL DOUCHE.

Frequent allusion has been made to the nasal douche as a means of cleansing the nasal cavities, and of applying to them medicated solutions. This method of local treatment was introduced into medicine by Dr. Thudichum of London, and is a great improvement on the use of the syringe. It is founded on the fact discovered by Prof. Weber, of Halle, that when we breathe with the mouth open, so as to cause the palate to approximate the pharynx, we can send a current of fluid through one nostril with the expectation of seeing it issue from the other, without the passage of any of the fluid into the mouth. The ordinary syringe, or the rubber hand bellows syringe in common use, may be employed for this purpose; and if, after starting the latter instrument, we simply raise the reservoir of fluid to a level higher than that of the nozzle, we secure a continuous stream of fluid without further pumping.

A special nasal douche, however, has been devised by Dr. Thudichum, who gives the following description of his apparatus, of which a representation is given in figure 51, and of the manner of its employment:—

Fig. 51.



Thudichum's nasal douche (after Thudichum).

"A rod of iron or brass, thirty inches in length, is fastened upright into a heavily loaded foot, so as to form a firm stand. On this rod slides a nut, which can be fixed at any height by means of a screw, and it carries an arm and ring with which is connected a high cylindrical glass vessel of a capacity of from one to two pints. The glass vessel is open above, and its cavity contracts within the ring in which it is fastened, here directly to pass into a small-bore muzzle, to which a suitably sized flexible india-rubber tube, thirty-six to forty inches in length, is fastened. To the other end of this india-rubber tube a stop-cock is fixed; and upon this a little cup-shaped collar, and upon this the cylindrical perforated nozzle of horn or of ebonite india-rubber. If now the glass vessel is filled with fluid, and the little stop-cock immediately underneath the nozzle is opened, the fluid will escape at the fine openings of the nozzle; and if the nozzle accurately fits the nostril, and the fluid is allowed to flow, the fluid will enter and fill the cavity of the nose.[1]

"Great care must be taken to insure an adequate fitting of the nozzle to the nostril of the person who is to be operated upon, as, if fluid escape by the side of the nozzle, it makes the operation difficult and troublesome. It is therefore necessary to have several sizes of nozzles, to be fixed upon the stop-cock at will;—for adults, sizes of diameters corresponding to the sizes 5, 6, and 7, of the thick probangs of instrument-makers; for young persons and children, very fine and more conical nozzles of india-rubber, or horn. These latter small nozzles have but one central aperture; but the large ebonite ones are provided with four openings on the convex part, for reasons which a little practice will show as cogent; for, as the nozzle has to be held in an oblique position, one or two openings are pressed against the membranous septum of the nose and closed, while at least one will be open and sufficient to afford a good stream of fluid, two or three giving a considerable current.

---

[1] On Polypus in the Nose, and Ozœna; their successful treatment by new methods. London, 1869.

"In order to avoid all possible chances of infection, and insure cleanliness, I lay it down as a desideratum, that every person using the apparatus should have his or her own nozzle, to be used exclusively by that person. In dispensaries and hospitals, where this cannot be so easily effected as in private practice, the utmost care should be exercised to clean the nozzles, and particularly the little openings, from any semi-solid matter which easily becomes firmly adherent to them. As the current is always directed outwards through the openings, there is hardly any chance of the interior of the nozzle becoming unclean or infectious. Yet it will be well to give to each patient, particularly if he be the subject of specific disease, his own apparatus. Even the suspicion that a patient might, by accident, blow into the tube and endanger his successor, will thus be avoided.

"**Fluids to be Employed for Rinsing.**—Pure warm water, when introduced into the nose by means of the apparatus, causes, in most persons, a very disagreeable sensation, ending in lachrymation and sternutation (or tears and sneezing), with subsequent copious discharge of watery mucus from the nose. If the quantity of water run through the nose be large, the 'cold' produced thereby, including the change in the sound of the voice, may last for some hours. To avoid this objectionable symptom, it is best to employ solutions of common salt, or other salts, of sugar or milk, for rinsing the nose. In the course of practice cases will arise in which all these solutions offer advantages. For general use, a solution containing a small teaspoonful of common salt in a pint of water is satisfactory. Some persons will bear less salt; others will tolerate more. Of this solution, having a temperature rather lower than that of the blood, from one to four, or, if desired, any number of pints, may be allowed to flow through the cavities of the nose. It does not easily produce sneezing, rarely lachrymation, and hardly ever any subsequent symptom of cold in the head. The saline solutions which, next to common salt, offer the greatest advantages, are those of the common phosphate of soda, and phosphate of ammonia and soda. They can be used by themselves, or mixed with the common salt. Their alkalinity has a beneficial effect upon the irritated Schneiderian membrane, and dissolves or loosens any deposits of mucus or pus, which so frequently dry and harden upon the surfaces of the nasal cavities. When these solutions are made with the common hot water of kitchen-boilers, they are a little turbid from phosphate of lime. The presence of this slight precipitate is no objection to its use; on the contrary, it is a convenient means of distinguishing this from other uncolored solutions which may be used at the same time.

"**Fluids to be Employed for Deodorizing.**—For this purpose I have employed dilute solutions of permanganate of potash. This agent has done me such excellent service in removing the fetor of the mouth in cases of typhus fever, that I was induced to apply it for the removal of the fetor of ozœna, and with the most striking and immediate success. A solution of from one grain to ten grains in a pint of water is a good proportion, according to the severity of the case. The solution taste alkaline, and acts as a feeble escharotic upon healthy, and particularly upon vascular or erythematous parts. When the margin of the nostrils is excoriated, the permanganate colors the excoriated part brownish; but the effect of this is rather beneficial than otherwise, as the excoriated and colored part dries easily, and, after the shedding of the faint brownish pellicle, appears healthy.

"**Mode of Applying Fluids.**—The fluid, of the proper composition and temperature, is poured into the glass vessel. All air in the india-rubber tube is now replaced by fluid, the escape of the air upwards being facilitated by gentle manipulation. The glass vessel is raised and fixed in the position which will give the desired pressure. A little fluid is now allowed to escape from the nozzle, to make sure that all air is expelled. The patient (or healthy person, if it is only desired to show the physiological experiment) is seated in front of a basin, with his head and face slightly bent over, the apparatus standing by his side. He is told to breathe through his mouth exclusively, and to abstain from swallowing. The nozzle, previously selected as of proper size, and connected with the apparatus, is now inserted into one of the nostrils, and held there by the patient's hand of the same side. The little stop-cock is now opened, and after a few seconds a continuous and rapid stream of fluid is seen to flow from the opposite nostril into the basin below. Persons who have control over themselves will always bear the experiment as here described; but young persons, nervous females, and children, become confused, begin to cry, or to swallow and breathe through the nose. In such cases the level of the fluid in the glass should be very little above the level of the introitus into the external ear, so that the fluid runs very slowly, or only drops out of the free nostril. The hand of the operator should be upon the india-rubber tube, to close it by compression the moment he sees bubbles come through the nostril, or perceives that the patient swallows or becomes confused.

"It is always well to let the fluid pass at first under slight pressure, in order to allow sordes within the nose to be loosened and crusts of dried matter to be softened. When this has been effected, it is useful suddenly to raise the glass vessel and produce a rapid stream, which will then scour the impurities away. In some cases I have done this repeatedly with success. The loosening of crusts and lumps of inspissated mucus is always attended with some irritation, and also with retardation and diminution of the current of fluid. The sudden increase of the pressure is the surest means of causing the least inconvenience to the patient, and effecting in the quickest manner the purpose of the operator.

"It is also well to reverse the current now and then, as sordes are much better detached in that manner. If only one nostril is diseased, or the principal seat of the disease, I allow the fluid to enter by the opposite side, and to leave by the affected nostril. I then change the current, and, filling the affected nostril, allow the current to leave by the healthy one. Thus half a dozen or a dozen changes may be usefully instituted. This reversal has sometimes the effect of throwing large lumps of inspissated mucus and pus upon the upper side of the soft palate; and as they are too large to be carried round the septum narium into and through the nasal canal by which the fluid leaves, they are taken into the pharynx and immediately ejected by the patient through the mouth. The presence of lumps upon the soft palate is, therefore, a cause of a sudden interruption of the operation. After the removal of these lumps, the operation may be continued as before. It is really surprising what an amount of sordes will sometimes be removed from the nose by the rinsing process. Any one who has seen it once, will easily conceive the manner in which, by means of these constant accumulations, nasal diseases become chronic, incurable, and lead to fearful suffering and death.

"**Medicinal Solutions.**—Although the solutions before enumerated act in a measure as alteratives, resolvents and escharotics, and, therefore, rarely constitute a sufficient medical application by themselves, yet they are more frequently used for preparing the nose for the application of energetic and specifically acting solutions. To this latter class belong the solutions of alum, sulphate of zinc, and sulphate of copper—the best astringents; the solutions of nitrate of silver and bichloride of mercury—the most suitable alteratives; and the solutions of chloride of calcium, in which suboxide or oxide of mercury is suspended in a finely subdivided state—the best specifics. Of stimulating solutions, a mixture of eau de Cologne with water or salt water is sometimes useful.

"The probable concentration of these solutions can be surmised from the circumstance that the sensibility of the healthy nasal cavity stands about midway between that of the eye and the mouth. When the nasal cavity is completely filled with fluid, the specific sense of smell cannot any longer be exercised; even the solution of eau de Cologne is not perceived to be such when it once fills the nose. The sense of smell being thus entirely obliterated by the fluid contained in the nose, the reflex effects which substances may exercise by means of this sense are entirely absent; and the only impingement which the fluids can produce is upon the filaments of sensitive nerves coming from the fifth pair. It is owing partly to this circumstance that comparatively strong medicinal solutions are borne by the nasal cavity without great secretion. Another circumstance favoring the application of stronger solutions is the ready manner in which the healthy surface of the nose defends itself against irritating, chemically impinging substances by means of a copious flow of mucus. Excoriated or ulcerated parts lack this power of rapid secretion; and hence they are affected by medicinal solutions much more than the healthy parts of the surface of the nasal cavity. What is here stated is the general result of experience and experiment; but, at the same time, I must insist that the application of medicinal solutions in each case should be begun with the greatest caution, as individuals differ greatly in point of irritability of the nasal cavity. In the beginning, therefore, very dilute solutions of medicinal substances should be used, and their strength be increased gradually, after their effect has been well exhausted, by the use of greater quantities, applied by a quick flow, or the use of smaller quantities in a slow current distributed over a longer time of contact.

"**Solution of Alum.**—Half an ounce of roughly-powdered crystallized alum is dissolved in a small quantity of hot water, and the solution made up to one quart by means of cold and tepid water in such a manner as to insure that the temperature of the solution should be below, but near to, blood-heat. In superficial ulceration or blennorrhagic conditions this solution is well borne. Ulcerated parts, which, before its application, were red, mostly appear as white patches after its application, thus showing that the effect of the alum on the ulcerated surface has been considerable. When I was desirous to manage with smaller quantities of solutions, I have sometimes mixed a little permanganate solution with that of alum.

"**Solution of Sulphate of Zinc.**—From a scruple to a drachm of the sulphate of zinc, dissolved in a quart of warm water, together with half an ounce of sulphate of soda or sulphate of magnesia, gives a suitable fluid.

"**Solution of Sulphate of Copper.**—Of this sulphate also from a scruple to a drachm, mixed with half an ounce of soda sulphate or magnesia sulphate, can be dissolved in a quart of warm water.

"**Solution of Acetate of Lead.**—Of this crystallized acetate from a drachm to two drachms, together with half an ounce of crystallized acetate of soda, may be dissolved in a quart of warm water.

"**Solution of Nitrate of Silver.**—Of this salt not more than from half a grain to a grain should be dissolved in each ounce of water. A quart of water, therefore, in which previously from half an ounce to an ounce of nitrate of soda has been dissolved, may receive from sixteen to thirty-two grains of the nitrate. In particular cases the solution may be made stronger. The nitrate of potash is not so good as the nitrate of soda, because it has slightly irritating qualities. When it is necessary to use it in an emergency, when soda nitrate cannot be had, the solution should be more diluted.

"**Solution of Bichloride of Mercury.**—The greatest caution is necessary in the use of this agent, as it has a tendency to produce excoriations on healthy surfaces. The first solution to be employed should be one containing five grains of corrosive sublimate in a quart of water, in which an ounce of common salt is also dissolved.

"**Solution of Chloride of Calcium with suspended Oxide or Sub-oxide of Mercury.**—These fluids are the common phagedænic waters, or black and yellow wash, to which common salt has been added. Two drachms of calomel, twelve fluid ounces of lime-water, half an ounce of common salt, and twenty ounces of warm water, yield the black solution. One scruple of corrosive sublimate, half an ounce of common salt, twelve fluid ounces of lime-water, and twenty fluid ounces of common warm water, yield the yellow wash. These mixtures must be well agitated in the glass vessel while being allowed to run through the nasal cavity.

"**Sedative Solutions.**—Of prussic acid forty minims to the quart of warm salt water, of tincture of opium two drachms, may be taken. These drugs may be added to some of the above solutions of metallic salts. But if this is desired, it is better to substitute a solution of morphia for tincture of opium. The prussic acid is incompatible with the copper, silver, and precipitated mercury solutions; it goes conveniently with the alum and common salt solutions.

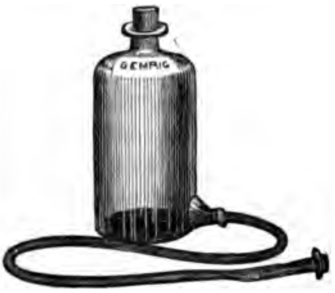
"**Styptic or Hæmostatic Solutions.**—Among these, ice-cold salt water, containing an ounce of salt to a pint of ice-water, takes the first place. When this, after having been continued for a considerable time, is insufficient to stop the hemorrhage, a fluid ounce of the tincture of the sesquichloride of iron may be added to each pint of ice-cold salt water.

"**Stimulating Solutions.**—One ounce of eau de Cologne upon ten ounces of salt water is a useful stimulant. Strong spirit of wine may be taken in place of the eau de Cologne.

"I have now fully, and for some readers, perhaps, somewhat too explicitly described a number of medicinal solutions which may with advantage be applied to the treatment of nasal diseases by the method in question. I was desirous to impress upon the memory of the reader the fact that I recommend only such solutions as are brought up to a certain specific gravity by salts which do not decompose the medicinal agents. There may be cases in which it is desirable to swell the Schneiderian membrane by watery fluid, and produce endosmosis, and others in which highly concentrated solutions may beneficially be used to effect exosmosis and shrivel Schneider's membrane. These adaptations, and the various accommodations of the fluids and their degrees of concentration, I must leave to the skill and ingenuity of those who make use of this method. They will also probably multiply the resources of the rhino-therapeutic pharmacy, and thereby add to the success and certainty of this interesting method of treatment."

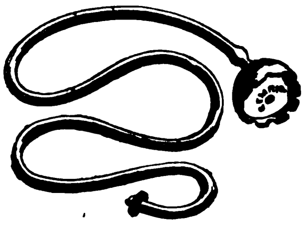
Various modifications of this douche have been made. Fig. 52 represents one in very common use. A bottle containing the fluid is held above the head, or placed upon a table higher than the head, and the current is controlled by compressing the rubber tubing instead of turning a stop-cock, as in the more perfect instrument. Fig. 53 represents a very portable douche, contrived by Dr. Thudichum, and, in fact, his original apparatus. It is a flexible tube attached to a perforated metal weight, which retains the apparatus at the bottom of a jug or other vessel filled with the fluid. By dipping the entire tube in the fluid, filling it with fluid before immersing it, or by suction with the mouth after immersion, or by compressing the tube from the vessel towards the nozzle, so as to drive out the air, the instrument is converted into a syphon, and the liquid escapes very readily. This is an admirable apparatus for patients who are travelling.

Fig. 52.



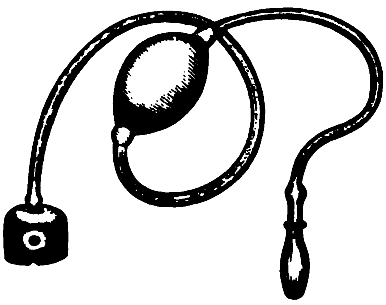
Nasal Douche.

Fig. 53.



Thudichum's Syphon Nasal Douche.

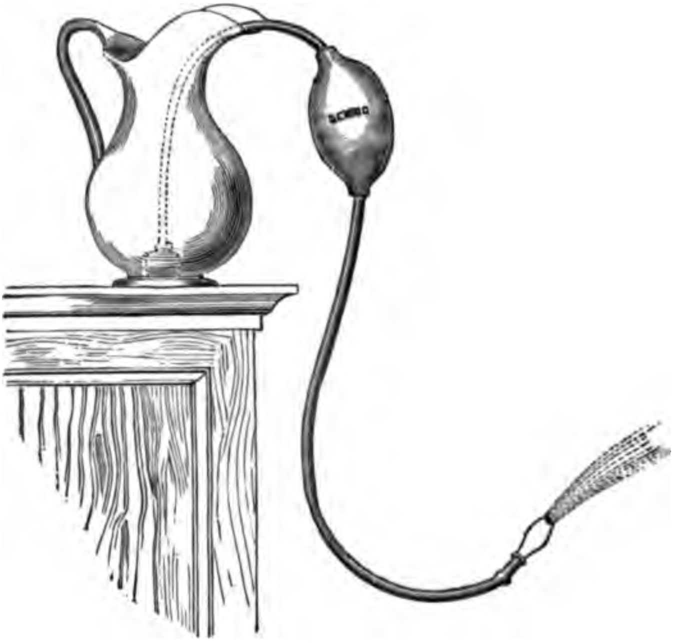
Fig. 54.



Syphon Douche with Compression Bulb.

Finding difficulty in teaching some patients how to use this syphon, the author modified this douche several years ago by placing a compression bulb of rubber in the course of the tube, the connections being made by small glass tubing. This form of apparatus is shown in Fig. 54. If now the bulb be compressed with one hand, and the nozzle occluded by the other, and the weight be placed in the vessel; on dropping the bulb by the side of the jug and releasing the nozzle the syphon is made, and the fluid flows readily, as seen in Fig. 55. In this apparatus, weight, nozzle, and connections are all of glass, rendering the apparatus very cleanly.

Fig. 55.



Manner of arranging Syphon Nasal Douche.

In using the douche, the nozzle is inserted into one nostril, the sides of which are compressed by the finger so as to exclude the air, and prevent the fluid from flowing back. The head is then bent well forward, the mouth opened, and the stream allowed to flow, when it will all pass out through the opposite nostril, provided there is no occlusion. In this way masses of accumulated mucus, inspissated secretions, etc., will be discharged. The process is then repeated on the opposite side.

Care must be taken that the solution be warm, and of a specific gravity near that of the blood. Neglect of the precaution to have the solution warm has resulted in producing severe inflammation of the internal ear, by the passage of the cold fluid along the Eustachian tube, and sometimes serious disease has ensued, even when every precaution enjoined by Thudichum and his followers has been observed; as has been recorded by Profs. Moos, of Heidelberg, and Knapp and Roosa, of New York,[1] and others. If the solution be too thin, it is apt to produce a cold in the head. For cleansing purposes, a drachm or two of salt to the pint or quart of warm water is usually employed, and the proportion increased or diminished according to the effects which it produces.

Sometimes the fluid enters the frontal sinuses, producing intense pain; so great in some instances that the method must be abandoned. So, also, must it be abandoned if it produces symptoms of disturbance in the auditory apparatus. On this account it is well, in all instances, that the first use of the douche should be carefully made under the supervision of the medical attendant; and that its effects be closely watched.

ANOSMIA.

Loss of smell occurs in connection with various affections of the nasal passages, from impressions made upon the terminal distribution of the olfactory nerves. Under these circumstances the sense of smell usually returns to a greater or less degree, as the disease which produced it is combated. Sometimes the sense of smell does not return.

---

[1] Archives of Ophthalmology and Otology, Vols. I., II., III.

Excitation of the Schneiderian membrane by the passage along it of the constant galvanic current, with interruptions, will sometimes arouse this dormant sense, and the treatment by electricity is therefore to be undertaken with confidence. The deprivation of this sense is very annoying to its subject, interfering, among other things, with the full enjoyment of food; so much of the sense of taste being abolished as is dependent upon the integrity of the sense of smell. It is therefore our duty to endeavor to excite the return of smell by the manner indicated, which appears to promise more success than the administration of drugs, or the use of topical applications. In the author's hands, as in the hands of others, electricity has sometimes proved adequate for this purpose.

Loss of smell is sometimes dependent upon cerebral disease. When this is the case, its return is contingent upon the relief to the trouble of central origin.

A case has been recorded in which the continual inspiration of the fumes of ether, accidentally, in the course of some experiments on animals, caused a gradual failure of the sense of smell, and at last its total aberration, the effect being attributed to the continuous contact of sulphuric ether with the minute branches of the olfactory nerve.[1]

The most frequent cause of anosmia, however, is due to blows received upon the head. Dr. William Ogle has recently studied the subject of anosmia[2] from this cause. He reports three cases in which the sense of smell, and of smell alone, was completely lost. Case 1, of twenty-seven years' standing, ensued after a fall sustained upon the back and side of the head; case 2, of two years' duration, from a similar accident; and case 3, more recent, from blows on the head received in a row.

Dr. Ogle attributes the loss of the sense of smell in these cases to rupture of the olfactory nerves, as they pass from the bulb through the perforations in the ethmoid bone. He maintains that anosmia of the affected side is present in every well-marked case of facial palsy. He presents several cases of partial loss of smell, and enters into the physiological points of interest concerning olfaction. His opinion is that the external root of the olfactory nerve is the only one directly concerned in olfaction; and that it depends upon the degree in which this root or its central termination has been disorganized, whether the loss of smell be complete or partial. In support of this view he cites an observation of M. Serres,[1] made many years ago, and founded on the results of nineteen post-mortem examinations of the bodies of paralytic patients, that lesion of the external root is much more efficacious in determining anosmia than is lesion of the internal root.

---

[1] (Virchow's *Archiv*, IV. 41, 1867), Syd. So. *Bienn. Retrosp.*, 1867–8, p. 84.

[2] Anosmia, or Cases Illustrating the Physiology and Pathology of the Sense of Smell; *Med.-Chir. Trans.* London, 1870, LIII. p. 263–290.

Dr. Hamilton, of Philadelphia, has recently placed on record[2] an account of a case of anosmia occurring after a blow received upon the occiput. Dr. Notta has also made the subject of anosmia the subject of a memoir.[3]

Acuteness of Smell is very often serviceable, especially in giving warning of the proximity of unpleasant or unhealthy emanations. It also permits the detection of certain diseases by the odor of their emanations, and thus enters into the field of differential diagnosis. The smells of small-pox, typhus fever, and other diseases are sufficiently characteristic; but it is maintained that the sense of smell is adequate to the recognition of syphilis; and it is recorded[4] that Dr. Stokes, of Dublin, as long as thirty years ago, expressed the opinion that the nose might be able to detect the difference between pneumonia and bronchitis. The faculty of smelling is one to be cultivated, therefore, and to be restored by therapeutic means when in abeyance. Too great an acuteness of smell, however, may become a great source of annoyance. Some curious cases of this kind are on record in general literature; one of the most remarkable of which occurred in the person of poor Caspar Hauser, all of whose senses were exquisitely developed, so much so as to be extremely annoying to him at times; but the sense of smell was most troublesome to him, and rendered his life miserable. He perceived odors where others could detect nothing of the kind. He was overpowered by the fragrance of a rose, and could distinguish fruit-trees from each other, at a considerable distance, by the odor of their leaves. The smell of old cheese produced nausea and vomiting; and that from a churchyard occasioned a paroxysm of fever. The so-called perfumes, employed for cosmetic purposes, were more disagreeable to him than many of the decidedly unpleasant smells. In fact, every odor, excepting those of bread, fennel, anise, and caraway, was more or less disagreeable to him, so much so that the only food he would partake of was bread and water.[1]

---

[1] Anat. Comp. du Cerveau, I. 295.

[2] *Am. Jour. Med. Sci.* Apl., 1871, p. 41.

[3] Recherches sur la perte de l'odorat. *Arch. Gén. de Méd.* Apl., 1870, pp. 385–407.

[4] *Brit. Med. Jour.* March 4, 1871.

SYPHILITIC AFFECTIONS OF THE NASAL PASSAGES.

These are sufficiently common, and exist as one of the manifestations of secondary syphilis. Under these circumstances the disease appears confined to the mucous membrane. It is usually attended by a chronic coryza, the matters of the discharge being viscid and of a yellowish or greenish color, sometimes sanguinolent, and, as a rule, more copious in the daytime than at night, perhaps from unconscious deglutition of portions of the discharge during sleep. There is no ulceration of the mucous membrane at first, but this is almost certain to occur if the affection is not arrested; and when ulceration has taken place the discharge becomes offensive in odor. There is thickening of the mucous membrane from inflammatory swelling and infiltration, producing pain and a sense of obstruction to nasal respiration. Much of the discharge passes anteriorly, but some of it is apt to be hawked into the pharynx, and may be seen upon its posterior wall behind the palate, in thick yellowish or greenish clumps. These irritate the mucous membrane of the pharynx, which eventually participates in the inflammation and becomes ulcerated; and in this way the disease may be propagated to the Eustachian tubes on the one hand, and to the larynx on the other.

In the tertiary form of the disease, ulceration of the mucous membrane occurs, and gradually extends into the cartilaginous and osseous structures, producing necrosis and permanent deformity of the nose for the want of its bony support. The peculiar symptoms attendant upon this condition have been narrated under the head of ozœna. Sometimes the mucous membrane seems to be implicated secondarily, after the disease has progressed in the bones. The external soft tissues sometimes become involved, and great destruction results, producing that condition known as syphilitic lupus. In a case of this kind reported by Dr. Durkee, of Boston, the cryptogamic parasite, *sarcina ventriculi*, was found in abundance in the discharge from the nostrils.[1]

---

[1] Feuerbach's Account of Caspar Hauser. Boston. 1832.

The secondary manifestations of the disease are managed by local ablutions with the douche or syringe, and, if necessary, the internal use of mercury. The tertiary form of the disease requires the local application of mercurials and detergents, in addition to ablutions, and the internal administration of the iodide of potassium and the bichloride of mercury; while dead bone must be removed where possible. This subject has also been discussed in the article on ozæna.

PARALYSIS OF THE NOSTRILS.

A single case of paralysis localized in the dilator naris muscle came under the author's observation some eighteen months ago. A gentleman, occupying a prominent position in a public academy, had been affected for some years with a difficulty of breathing through his nostrils, which produced snoring in sleep, necessitated his keeping his mouth open, which brought on pharyngitis sicca, and rendered him otherwise uncomfortable. Bidding him make a nasal inspiration, I saw that the nostril closed externally in the act. Holding the nostril away from the septum by a pair of forceps, I found that breathing went on tranquilly and without effort. Careful exploration showing that there was no disease in the tissues of the nasal passages, the opinion was formed that there was paralysis of the dilator muscle of the nostril; and local applications of electricity were recommended.

---

[1] *Am. Jour. Med. Sci.*, Jan. 1854; p. 96.

As the patient could not remain in the city at that time, and wished to postpone treatment until his summer vacation, I had two silver plates made the size of the nostrils, separated by a weak spring; the plates were pressed together and inserted into the nostril, and on relieving the pressure the blades expanded and kept the nostril dilated. This instrument relieved the entire trouble. It was not visible externally, and could be very readily removed for purposes of cleansing. As the patient did not return at the period of his vacation, I presume he felt satisfied with the relief that had been afforded.

OCCLUSION OF THE NOSTRILS.

Mr. Durham[1] states that in some instances the nostrils are more or less completely closed by membrane,[2] in others by firm fibrous tissue, or by simple continuity of integument, while in other cases, one ala or both may be adherent to the septum or to the upper lip. In the treatment of this class of cases all that is usually required is to make a suitable incision, and to keep the surfaces apart, by pieces of lint or a canula, until the parts are healed. Constriction and occlusion of the nostrils, as the result of accident or disease, I have seen following fracture sustained in pugilistic encounter, and also as a result of contraction following ulceration. The mucous membrane was thickened in these cases from interstitial deposit, and where this is the case the difficulty can often be overcome by pulling off patches of mucous membrane so as to leave raw wounds of some size. As the edges of these sores cicatrize, a contraction of the sides of the nostril takes place, thereby permanently increasing the caliber of the tube. The operation is painful and bloody. The repeated employment of compressed sponge, or perforated rods of laminaria, increase the dilatation and maintain it; but their use must sometimes be persisted in for months together, with occasional resort to them afterwards. In some instances it is necessary to remove more or less of the middle turbinated bone in order to secure a free passage for the air through the nostrils.

---

[1] Holmes' System of Surgery, Vol. 4.

[2] Richerand; Nosographie Chirurgicale, 4th Edit., tome II. p. 156.

Occlusion of the nostril may occur as a result of small-pox, as in the case of Brown, to be mentioned in connection with the subject of concretions in the nasal passages.

Fracture of the nasal bones and fracture of the nasal cartilage sometimes produce more or less occlusion of the nostrils, either as an immediate result of the accident, or as an effect of the inflammation following. When such a result is to be apprehended, the nostrils may be kept sufficiently pervious for respiratory purposes by the use of metallic tubes inserted into them.

CONGENITAL OCCLUSION OF THE POSTERIOR NARES.

Congenital occlusion of the posterior nares is occasionally met with. A single instance of this affection has come under the author's personal observation. The infant had great difficulty in suckling and in breathing, and was subject to frequent suffocative paroxysms. An opening was made into the pharynx by boring through the structures with a knife and a steel probe; and this was kept open, and enlarged from time to time by the passage of the sound, and subsequently of small bits of sponge securely fastened to a holder. In this way passages were made representing the lower and middle meatuses. The operation was always attended with considerable hemorrhage, and was a frightful one in appearance, from the struggles of the child, the spattering of the blood, and the suffocative spasms that it produced. As soon as a permanent passage was secured, the child's nutrition improved at once, and markedly.

Dr. Carl Emmert narrates[1] a case upon which he operated with a happy result. It was a seven-year-old boy, who from birth had been unable to breathe through the nose, and who was nourished when an infant only with great difficulty. He was subject to attacks of suffocative paroxysms in his sleep. The nose was well formed, but the choanæ were entirely closed. Not the slightest stream of air was perceptible at the nostrils. Mucus was continually running from them, and on weeping, the discharge was accompanied by a stream of tears. The closure of the choanæ was due in this case, as shown by a preliminary examination with the sound, and as confirmed during the operation, to the presence of a bony wall or partition, covered on both sides with mucous membrane; but it was impossible to ascertain in what manner or from which bones this complete anterior wall of the naso-pharyngeal space took its origin.

---

[1] (Lehrbuch der Chirurgie, Stuttgart, 1853, Bd. II. p. 535.) Luschka; Der Schlundkopf der Menschen, 1868, p. 27.

Luschka, in continuation of the subject, narrates the following case which occurred under his own observation: It was a female infant who died shortly after birth. The bony foundation was formed, on both sides, from the palate bone. The free sloping border of the normally sized horizontal portion was continued in the form of a thin compact lamella, which inclined somewhat outwards and backwards, and rose up as high as the inferior face of the sphenoid bone, with which it was connected by a dentated border. The plate of bone rested with sharp border upon the median side of the internal laminæ of the wings of the sphenoid. In the middle line, where, in the normal condition, the nasal spine arises, the lamella joined with that of the opposite side; while both, in their further course upwards, were separated by a very narrow fissure, in which the posterior border of the rudimentary vomer had its attachment.

INFLAMMATION OF THE SEPTUM NARIUM.

Inflammation of the septum narium sometimes occurs as the result of injury or external violence. This may lead to the formation of an abscess. Inflammation and abscess also occur independently of local injury. There is pain, heat, dryness, and swelling of the parts, sometimes in sufficient extent to occlude the nostrils completely. The pain often extends to the frontal sinuses. The abscess may form on either side of the septum, or on both sides. The diagnosis is easy. The appearance of a tumor, the sense of fluctuation, and the history of the case, with more or less manifestation of fever, indicate the nature of the affection.

The local treatment consists in prompt incision of the abscess and evacuation of its contents. If the parts do not return promptly to their natural condition, the local use of the mineral astringents may be called for.

Chronic inflammation of the nose, especially in syphilitic and scrofulous cases, not unfrequently terminates in ulcerative destruction of more or less of the cartilaginous septum. There may be several perforations, or one large orifice; more frequently, perhaps, the latter. Very often the result of the examination by the surgeon will be the first intimation to the patient of the existence of a perforation. It is met with independently of any history of local disease within the patient's memory. Some authors believe it to be congenital. The probability, however, is, in at least a fair proportion of instances, that the perforation has resulted during the course of a syphilitic coryza in early infancy.

If the edges of the perforation show any disposition to ulceration they should be washed with a solution of nitrate of silver or some substitute; otherwise careful washing with warm water or soap-suds, conveyed on the end of a soft rag, will remove the inspissated mucus which sometimes adheres to the edges, and thus keep the parts clean and comfortable.

Operations have been performed for the closure of the perforation by plastic transplantation.

SUBMUCOUS INFILTRATION AT THE SIDES OF THE VOMER.

Since my attention has been directed to rhinoscopy, I have very frequently met with a peculiar condition of parts in nasal troubles which, as far as I am aware of, has not yet been specially described. It consists in a puffy condition of the mucous membrane on the sides of the posterior nasal septum. From personal experience, and as the result of conversations with Dr. Elsberg, of New York, and others, I am inclined to believe that it is a very common affection.

The symptoms are those of an obstruction at the posterior nares, and they are often referred to polyps. On examination with the rhinoscope we observe at each side of the septum, and confined to the posterior portion, a tumid mass, of a whitish color, markedly distinct from the red color of the adjacent mucous membrane. The mass almost always, as I have seen it, occupies the lower portion of the septum, extending upwards to a greater or less extent, and sometimes occupying the entire length of the septum. I have never seen it at the upper part, with a line of demarcation below. The affection is usually symmetrical, but often exists to a greater extent upon one side than the other. The masses are roundish, with very convex outlines, and sometimes extend half way across the choanæ, and occasionally very close to the outer margins of the nares, if not in contact with them. The appearance of the mass is suggestive of polyp, but it is by no means of this character. It appears to be an œdematous protrusion of the mucous membrane from an accumulation beneath it of serum or serous mucus. The tumor usually yields readily to the pressure of the probe or other instrument, carried up behind the palate, or introduced through the nostril, being soft and elastic to the touch.

This condition exists sometimes, to a very limited extent, in cases of ordinary chronic coryza, but the œdematous protrusion is slight, and apt to be constricted at one or two points of its extent; a similar moderated degree of the affection occasionally attends cases of glandular enlargement at the vault of the pharynx.

The treatment of this affection in my hands has consisted in tearing away portions of the protrusions by forceps carried up behind the palate, or introduced through the nostril, as the case may be; or puncturing them with the laryngeal lancet, the operation being performed under guidance of the rhinoscope. There is not usually a great deal of hemorrhage. After the operation the parts are cauterized.

The manipulation is an exceedingly difficult one in many instances, severely taxing the patience and ingenuity of the operator, as well as the endurance and amiability of the patient. Mere puncture with the concealed lancet has not afforded good results in my hands, though it will unload the part for the time. The cicatrization of the edges of the wound made by tearing away the mucous membrane enlarges the passage for air, and is in this way beneficial.

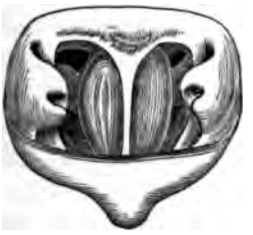
The affection is an obstinate one, and apt to recur again and again.

I look upon the affection as similar, in many respects, to the protrusions of the mucous membrane met with in the anterior nares and simulating polyp; only in the latter cases the tumors are red, and in the former cases they are white or whitish.

The use of the galvano-cautery would form an appropriate means of destroying these protrusions, from the promptness with which it acts, as it is hard for patients to bear contact with these parts for more than a second or two, but from want of a skilled assistant, and the amount of trouble required in its use in cases of this kind, I have not resorted to it, though frequently tempted to do so.

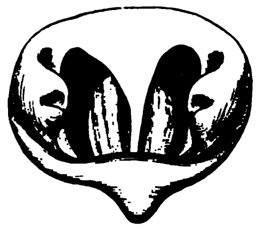
Figs. 56 and 57 from two of my cases will serve to illustrate the nature of this affection. The tumid swellings are easily recognized each side of the septum, where they cut off the views of the turbinated bones.

Fig. 56.



Rhinoscopic Image of Œdema of Nasal Septum.

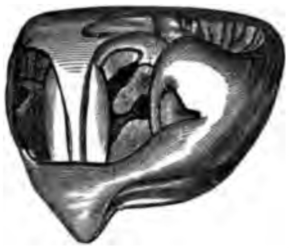
Fig. 57.



Rhinoscopic Image of Œdema of Nasal Septum.

Fig. 58 represents a marked case of this affection in the person of a medical gentleman under my care at the moment of writing. The view represents a prominent view of the left side of the pharyngo-nasal region, representing the pharyngeal end of the Eustachian tube of that side and its orifice, and a deep indentation or groove marking the boundary line between the vault of the pharynx and the nasal portions. This space and the fossa of Rosenmüller below it was bridged by numerous bands of adhesions. A portion of the œdematous membrane of the left side was pulled off with

Fig. 58.



Submucous Infiltration of Posterior Nasal Septum, supposed to be due to Mycelium.

angular forceps passed behind the soft palate, and the mass of jelly-like consistence carried by the gentleman to Dr. J. Gibbons Hunt, a distinguished microscopist of Philadelphia, who discovered in it abundant evidence of the vegetable fungus mycelium, and advised the local use of carbolic acid for its destruction. The application has been made two or three times, but so far without effect.

TUMORS OF THE SEPTUM.

Tumors of various kinds occasionally appear in the septum. These may be mere ecchymoses, the result of blows, which appear as tumid swellings, sometimes on one side, sometimes on both. Their prompt appearance and the history of violence will serve to intimate their true nature. They usually subside spontaneously by absorption of the effused blood. If this does not take place, their contents should be evacuated by incision, otherwise they may provoke inflammation and abscess.

Colloid tumors are said to occur occasionally in this situation. The treatment would consist in evacuation of the sac by excision, and local medication of its remains so as to excite adhesive inflammation.

Cartilaginous tumors are said to grow occasionally on the septum, and usually require external division of the nose for their removal. The cartilaginous hypertrophy of the septum sometimes encountered, is spoken of in connection with the subject of deviations of the septum.

Fractures of the nasal septum occasionally occur, and, when comminuted, may obstruct the nostril to a considerable degree. Prof. Gross[1] mentions a case brought to him four months after the septum had been broken into several pieces, in which there was encroachment upon the left nostril to such an extent, as to cause almost complete obstruction to respiration on that side. In order to afford relief he was compelled to cut away the whole of the offending part.

---

[1] System of Surgery.

DEVIATIONS OF SEPTUM FROM MIDDLE LINE.

A sub-periosteal resection of the nasal septum for the remedy of deviation has been resorted to by M. Chassaignac.[1] A curvilinear incision is made in the antero-posterior direction low down into the mucous membrane, and this flap is separated from the cartilage by means of a spatula, and then turned over. Several slices are then cut from the cartilage until a point has been reached which admits of its being readily pushed over to the middle line. The flap of mucous membrane is now replaced, and the parts are retained in their new position by a bit of sponge inserted into the nostril.

The unpleasant symptoms of this affection are sometimes relieved by cutting out a piece of the septum, and thus establishing a communication between the two passages.

Other surgeons have divided the nose in the middle line and resected the septum.

A few years ago I saw Prof. Pancoast relieve a case of this kind, attended by deformity of the organ to one side, in which the deviation had been acquired by blowing the nose by the aid of the finger and thumb. The nostrils were tamponed anteriorly and posteriorly; and the cartilaginous portion of the septum separated from the bony portion by subcutaneous division with a tenotome. The organ was then forcibly pulled to the opposite side, and maintained in position by adhesive strips.

Much can be done in some instances by inserting metallic tubes in the nostrils and exercising dilatation and gentle compression in this way. The use of the compressed sponge, or of the tubes of laminaria, as mentioned in connection with the subject of thickening of the nasal mucous membrane, will often succeed eventually in overcoming a deviation of the septum, without any necessity for a resort to the knife.

FOREIGN BODIES IN THE NOSTRILS.

Children very often insert foreign bodies, such as peas, beans, small stones, etc., into the nasal passages, which, if discovered, or acknowledged by the child, are very readily removed. Sometimes they are forgotten and remain impacted for years, keeping up well into adult life an irritating and often offensive discharge, which is supposed to be due to nasal catarrh of scrofulous origin, or to ozæna. The foreign body becomes incrusted with calcareous matter, and sometimes forms the nucleus for a veritable calculus; and may eventually produce necrosis of one or more of the turbinated bones, necessitating their removal, at which time the cause of the life-long discharge is discovered to have been the presence of an impacted foreign body, unsuspected or long forgotten.

---

[1] *Gaz. Hebd.*, June 11, 1869, p. 380.

Strict inquiry as to the presence of a foreign body should always be instituted in every case of offensive discharge from the nostrils; and the word of the patient or friends should not be depended upon. It is the duty of the medical attendant to wash the parts thoroughly, and then examine them carefully by a good light, both by inspection of the nostrils anteriorly, and, where practicable, posteriorly, in the rhinoscopic mirror.

A foreign body is rarely introduced into the nostrils of the adult except by accident, the exceptions being confined to patients with hysteria, or insanity.

Usually, the presence of a foreign body in the nostril produces inflammatory action, dependent a good deal upon the shape of the body and the character of its edges. If it be sharp, spiculated, or irregular, the irritation will be much more than when it is smooth in contour. This inflammation will result in the production of a catarrh which will be likely to take on the appearance of a chronic coryza, with the copious secretion of pus; while, if the foreign body be of a large size comparatively, or be of such a character as to become swollen at the place of impaction, the nose will become distended out of its normal shape, and the pain and other local symptoms will increase in severity. Sometimes ulceration will be set up in the parts against which the foreign body is lodged, and this will complicate the condition of things.

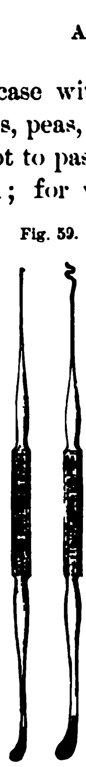
When foreign bodies remain a long time in the nasal cavities, they are apt to become incrusted with the saline portions of the serum which is secreted in consequence of the irritation they produce, and in this way form the rhinoliths or nasal calculi sometimes found in this region. These may be very small, or increase by accretion to the size of a hazel-nut or larger. Sometimes they are discharged spontaneously, but usually have to be extracted by surgical procedure, generally with the forceps. Their presence is usually detected by the probe, though sometimes they are exposed to inspection on distending the nostril.

Occasionally the foreign body is an insect which has crawled into the nostrils from without; a leech; or a human parasitic worm which has crawled into the posterior nares from the stomach. In cases of the latter kind, the parasites, usually ascarides, may crawl into the frontal sinus, producing intense headache and leading to delirium, which may end fatally. The older physicians used to attribute bad cases of ozæna attended with severe pain in the frontal region to the presence of insects or their larvæ in this situation.

The treatment for a foreign body in the nostril should be directed to its removal at the earliest moment. In some instances it can be dislodged by exciting the act of sneezing by the use of snuff, or by tickling the mucous membrane with a feather. The injection of a strong stream of water through the nostril from behind forwards by means of the posterior nasal syringe, or the douche of Thudichum passed from the sound nostril, will sometimes succeed in driving the foreign body out the road it entered. If the nasal douche be employed for this purpose, the reservoir should be placed very high, so as to lend as much force as possible to the current. Curved bougies or catheters may be passed from behind forwards, in the hope of getting in the rear of the obstacle and pushing it towards the exterior. Where the foreign body is impacted, and there is danger of pushing it farther on by the use of instruments inserted into the nostrils, attempts should be made in the manner indicated to push it out forwards from behind. This is a much better plan than the opposite one sometimes employed, an endeavor to push the body on into the pharynx and then extract it through the mouth.

Unless the foreign body be favorably situated and of suitable shape, the forceps should not be used to extract it, on account of the danger of impacting it more firmly. This is particularly the case with bodies of rounded or smooth contour, such as beans, peas, beads, and the like. A much better plan is to attempt to pass a slender hook behind the body, and draw it forward; for which purpose the little rectangular hook, or the screw devised by Prof. Gross for the removal of foreign bodies, and which is attached to the ear-scoop furnished in the pocket-case known as "Gross's pocket-case," is a most admirable instrument; for there is almost always room enough to pass so slender a body between the obstacle and the wall of the nostril.

Fig. 59.



Gross's instruments for removal of foreign bodies from the nose.

In cases of the presence of parasites in the nasal cavities, it has been proposed to kill them by the injection of vapors of alcohol, turpentine, etc.; or by the injection of vermifuges, such as are employed to kill worms in the intestines. These parasites have been known to penetrate into the frontal sinuses; and in one instance, alluded to by Trélat,[1] to have necessitated trepanning the sinus, in order to be able to extract them.

Dr. C. Coquerel reported[2] five cases in which the larvæ of diptera in the nasal passages and frontal sinuses produced violent symptoms, followed by death in three of the cases. In most of the cases, several hundred larvæ were evacuated by ulceration and necrosis of parts investing the cavities. These cases occurred at the convict hospital at Cayenne; and it is supposed that the larvæ were the issue of eggs deposited in the nasal fossæ by a peculiar fly, and were not parasites. In the original article Dr. Coquerel quotes several analogous cases from authors who had observed similar occurrences in Europe.

A somewhat similar case was communicated many years ago to the Philomathic Society, by M. Jules Cloquet.[3]

---

[1] *Gazette Hebd.*, 1867, No. 51, p. 814.

[2] (*Arch. Gén. de Méd.*, May, 1858; *Brit. and For. Med.-Chir. Rev.*, Oct., 1858); *Am. Jour. Med. Sci.*, Jan., 1859, p. 255.

[3] *Am. Jour. Med. Sci.*, May, 1828, p. 228.

In cases of foreign bodies of long standing, where the usual means of extraction have proved unsuccessful, or are unavailable, it has become necessary to seek the foreign body through an external incision; to which end Vidal has recommended division of the wing of the nose, and Dieffenbach its division in the middle line.

In cases of foreign bodies impacted in the frontal sinuses, it has been proposed to divide the nose at its root, and turn it over upon the face; an operation which has also been recommended for obtaining access to tumors in the same situation.

CALCAREOUS ACCRETIONS IN THE NASAL FOSSÆ.

Calculi, as already mentioned, are occasionally met with in the nasal fossæ; their origin being usually due to some foreign body of suitable size and consistence, which has been forced up the nose in childhood, and eventually been converted into a nucleus for the deposit of calcareous matters. In other cases they have been found to be due to a deposit of the inspissated mucus, or sanguinolent secretions from the inflamed mucous membrane. Such accretions are known as rhinoliths. They are generally movable, and readily broken into fragments, being composed, according to Demarquay,[1] of phosphates of lime and magnesia, chloride of sodium, and carbonate of lime, magnesia, and soda.

Sometimes they are found without any apparent cause whatever; and their appearance is attributed to the gouty diathesis, in the same way as is the appearance of gouty concretions sometimes observed in the membrana tympani.

These rhinoliths vary in size, from that of a small bead to that of a hazel-nut; and they may obstruct the nasal passage completely, pressing the septum before them so as to encroach upon the caliber of the other nostril. They give rise to the ordinary symptoms of obstruction and irritation, with frontal or nasal pain, constant or intermittent; and may induce severe inflammation, with a copious muco-purulent discharge. Sometimes small concretions are discharged into the handkerchief, at once indicating the nature of the affection. Examination by the speculum anteriorly and by the rhinoscope posteriorly will sometimes lead to their detection. In other instances they are recognized by the touch on careful exploration of the walls of the cavity and the surface of the turbinated bones with the probe. Care must be taken against mistaking them for exposed bone. Before commencing the exploration it will be advisable to wash away the secretions of the parts as thoroughly as may be, by means of the syringe applied posteriorly as well as anteriorly. Perhaps, with a view to detachment, it will be better to begin the cleansing process with the posterior nasal syringe.

---

[1] Mémoires sur les calculs nasaux. *Archives Générales de Médecine*, 4 Ser. Vol. viii., p. 174, June, 1845.

The treatment consists in removal of the concretions, an operation which must often present some difficulty. Where they are quite accessible, delicate polyp forceps can be employed. Mr. Durham, in *Holmes' Surgery*, suggests delicate forceps with separate blades, similar to midwifery forceps. Where the calculus is large and apt to injure the soft parts in its removal it might in some instances be crushed, in order to facilitate extraction; and the débris could be washed out from behind by a stream of water from the posterior nasal syringe, or from a nasal douche entering by the opposite nostril. In some instances a knife might be passed under the edge of the calculus a short distance into the soft parts, and the calculus be then pried out in part by a blunt instrument.

Occasionally the concretion may be pent up, in consequence of adhesion of the nostrils; as occurred in a case reported by Wm. H. Brown,[1] in a patient whose nostrils were closed by cicatricial tissue, the result of small-pox in childhood. An incision through the occluding membrane enabled him without difficulty to extract the stone, which weighed three drachms and thirty-three grains.

Sometimes the presence of these concretions keeps up local suffering for years. A very curious case of periodical hemicrania, terminating by the evacuation of a nasal calculus, has been recorded by Dr. Axmann.[1] A female, aged fifteen, complained of pain in the region of the left frontal sinus, extending to the same side of the head. It returned daily at 10 A.M., and lasted until 5 P.M. Sometimes the pain was excessive, affecting the left side of the face, and inducing tumefaction around the eye; and during the paroxysms there were nausea and vomiting. The left nostril was dry. She married at twenty-one and bore children during fifteen years, and with slight exception was comparatively well. Three years after her last delivery the headache returned with violence; and she was under treatment for two years, when, under the influence of a pinch of snuff, a calculus, the size of a bean, escaped from the left nostril. During the following year she passed several calculi under the influence of sternutatories, and the effect was followed by a discharge of fetid pus; since which time the woman had remained perfectly well.

---

[1] *Edin. Med. Jour.* Vol. v., p. 50.

TUMORS IN THE NASAL PASSAGES.

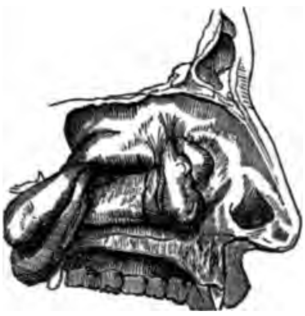
Tumors are frequently met with in the nasal passages and their communicating cavities. They have their origin, usually, in the mucous membrane, but are occasionally connected with the periosteum or perichondrium.

The most frequent variety of tumor encountered in this situation is that of the polyp, which presents itself in the form of a roundish or elongated body, usually pedunculated, but sometimes attached by a broad base, and varying in size from that of a small bean to a size large enough to distend the nose out of shape, and obstruct the respiration through the organ completely. There are several varieties of polyp, the most frequent of which is the mucous or gelatinous polyp, which springs from the mucous membrane, originating in an enlargement of the acinous glands, with which the nasal mucous membrane is so richly provided. As the gland enlarges, the mucous membrane covering it becomes hypertrophied and elongated, which, with its contents, constitutes the polyp. It is of a whitish color, and of soft consistence; its appearance is not unlike that of an oyster, to which it has been aptly compared. It is usually pedunculated, of an irregular pyriform shape, with smooth surface, and usually hangs downwards into the nostril, or backwards out of the posterior nares; the former much more frequently. Sometimes it is impacted in the free space of the nasal cavity. The point of origin is usually the superior turbinated bone, though it may arise from the other turbinated bones. It is sometimes solitary, but much more frequently multiple; and, occasionally, immense masses come into view after the removal of a large polyp — masses which, when removed, seem to occupy much more space than that of the cavities in which they grew. On account of their soft consistence, these smaller polyps become closely packed in the recesses of the nasal cavities, never having had room to expand until the removal of other masses which had been compressing them.

---

[1] (*Heidelberg Klin. Annalen; Arch. Gén.*, May, 1829); *Am. Jour. Med. Sci.* Vol. v., p. 204.

Fig. 60.



Gelatinoid nasal polyp.

This form of polyp swells in damp weather, on account of the hygrometric nature of its contents.

These polyps are usually produced as a result of chronic coryza; "from the simple hyperplasia of which," says Virchow, "polypi take their origin; which, at a later period, may become the seat of veritable cancer."

A much less frequent variety of the polyp is the fibroid or fibrous polyp, a growth of much firmer consistence; taking its origin not from the mucous membrane, but from the connective tissue beneath it, or even from the perichondrium or periosteum, as the case may be. It is usually single, and attached by a broad base, though often met with a small pedicle. It acquires a larger bulk than the gelatinoid polyp, is of much firmer consistence, and red in color, like the color of the surrounding mucous membrane. When not removed it is liable to grow in every direction, protruding backwards into the pharynx, and insinuating itself by prolongations into the sinuses communicating with the nose, so as to produce that species of deformity which has been termed "frog-face." Sometimes it forms connections with the base of the skull, in the same manner as the naso-pharyngeal polyp, and on this account subjects the patient to consequences of the most serious nature, from the effects of an operation for its removal.

A form of polyp denominated granular is also occasionally found in the nasal cavity. This glandular polyp, also, occasionally takes similar connections, and renders its possessor liable to serious accident as a result of operation.

A remarkable case of this kind occurred in the service of M. Demarquay,[1] in which a physician seventy-four years old had suffered, for four years previously, with an abscess of the frontal sinus, which was cured by trepanning the anterior wall of the sinus. In September, 1868, Demarquay extirpated a nasal polyp, the operation being followed in three days by erysipelas of the face, which pursued its usual course, and in a few days the patient returned home well. In January, 1869, he returned, on account of an affection of the right nostril; and Demarquay removed a polyp the size of a walnut, and grayish-white in color. On the seventh day erysipelas again set in, but passed off without any unpleasant result. On March 23 the patient returned with a fresh polyp, which, on examination, was found to fill up the choanæ. April 2, Demarquay extracted it with polypus-forceps, and cauterized the nasal mucous membrane with the solid nitrate of silver. In the evening the patient complained of severe pain in the right side of the head, for the relief of which a hypodermic injection of .01 gramme of morphia was used, which was followed by marked symptoms of poisoning by morphia. This promptly subsided. April 16, there suddenly ensued paralysis of the lower eyelid of the right side, and of the muscles of the globe, the pupil being dilated and not reacting to stimulus, a condition of diplopia existing. The patient died in about a week.

The extirpated polyp was found to consist of a firm connective-tissue stroma, which contained, in its outer circumference, spaces covered with cylindrical epithelium, showing that it was an outgrowth from the glands of the mucous membrane.

---

[1] *Le Mouvement Médicale*, 1869, 19, p. 221.

At the autopsy the brain was found healthy; the meninges of the right side were richly supplied with blood; the arteries at the base of the cranium had undergone atheromatous degeneration. Several points of pus on the sella turcica had proceeded from the bone, which was carious and readily permitted penetration by a probe. One of the roots of the polyp was inserted into this bone. The sinus cavernosus was filled with pus. The roots of the polyp stretched to the smallest anfractuosities of the nasal passages, and into the maxillary sinus; these cavities being bathed with a mixture of mucus and pus, as were also the frontal sinuses, ethmoid cells, and the surface of the cribriform plate.

A polyp may become incrusted with calcareous deposits, and thus give rise to the incorrect diagnosis of an osseous tumor.

When a polyp is deeply situated, and cannot be exposed even by means of a strong light thrown into the dilated anterior nares, we can sometimes thrust it forward by the finger, passed underneath and behind the palate into the posterior nasal fossæ; and, should this fail, we may resort to the expedient adopted by M. Edouard Fournié,[1] who, in a case of mucous polyp of this kind, introduced the sound of Bellocq, and, attaching to it a pledget of charpie, was enabled to force the polyp forwards, so as to operate upon it in a satisfactory manner.

Usually, however, by dilating the walls of the nostril with one of the instruments mentioned in the article on examination of the nasal cavities, the existence of a polyp can be readily detected.

The mucous or gelatinoid polyp is sometimes amenable to the topical influence of astringents; but, as a rule, forcible extraction is required.

Various remedies are reported as capable, under favorable circumstances, of destroying a polyp of this kind, or inducing its absorption. Thus, we have an instance recorded[2] of cures by the saffronized tincture of opium (Prussian pharmacopœia), which, according to Dr. Primus, of Babenhausen, possesses the property of gradually destroying nasal polypi. A cure is reported, among others alluded to, as occurring in a case of polyp in each nostril, in a man forty-six years of age. The tincture was applied, by means of a hair-pencil or a roll of lint, to the bases of the growth, several times a day. In eight days the tumors had assumed a paler appearance, and lost a little in volume. A serous discharge from the nose, which had existed for a long time, had diminished, and the pituitary membrane had acquired a more lively tint, as if in a sub-inflammatory state. The application was persisted in, the tumors continued to decrease, and at the end of three weeks had disappeared entirely.

---

[1] *Gazette des Hôpitaux*, 1862, Oct. 11.

[2] (*Mediz. Chirurg. Zeitg. London Med. and Phys. Jour.*, Jan., 1828); *Am. Jour. Med. Science*, vol. ii., p. 219.

Dr. Bryant[1] extols the insufflation of pulverized tannin to destroy these polyps, or to modify the condition of the mucous membrane, and has thus obtained permanent cures. Six cases are reported, in two of which the cure had been permanent at the end of one and three years, respectively. The other cases were more recent, and in each one of them several operations had already been performed for the extraction of polyps. The duration of treatment varied from ten days to a month. Of late we have heard little of this remedy.

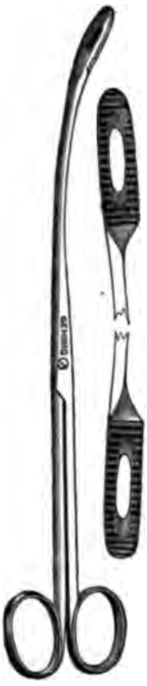
Removal of Nasal Polyps.—The ordinary method of removing a pediculated polyp from the nose is by means of torsion with the forceps. A slender pair of polypus-forceps, slightly curved, with fenestrated and serrated blades, much used in this country, is depicted in Fig. 61.

The patient being placed so that a strong light illumines the nostrils, with the head supported if desired, the nostrils are dilated by turning up the tip of the nose, or by introducing a nostril-dilator. The forceps are then passed up as high as the pedicle of the growth, which is then firmly grasped by the blades, when the instrument is turned round and round on its axis until the tumor is detached. Sometimes a portion only of the growth comes away in the instrument, and its reintroduction is required to detach the remainder. If several tumors are present they should all be removed, if possible, one after the other, rather than to wait for a subsequent occasion. If the bleeding which occurs obstructs the view, the parts are washed out by the syringe, if the patient cannot discharge the blood and mucus by blowing the nose. The bleeding is not usually profuse, but, if it cannot readily be restrained by astringents, the nostrils can be plugged with the tampon.

---

[1] (*Lancet*, Feb. 23 and Aug. 24, 1867); *Gaz. Hebd.*, Oct. 11, 1867, p. 653.

Fig. 61.



Polypus-Forceps.

This process of twisting is painful, and though not as apt to injure the mucous membrane, or tear off a portion of the turbinated bone, as where the polyp is forcibly pulled from its attachments, this accident occasionally occurs. It may be avoided by passing a wire snare over the polyp, and cutting through the pedicle by drawing the loop home into the canula, or perforated rod, through which it has been passed. The instrument for this purpose is similar to that used for removal of aural and laryngeal polyps. The difficult point in the operation exists in snaring the polyp in the first instance, and then in guiding the wire to the base of the pedicle; but it can often be accomplished.

When the tumor is deeply situated, or hangs loose behind the palate, it may be encircled by passing a long wire, doubled into a loop, through the nostril into the mouth. The ends of the wire being held by an assistant, or by the patient himself if the operator is unassisted, the finger is then carried behind the palate, and the loop drawn out in front of the polyp, after which it is pushed behind the mass so as to encircle it, and, as the wire is drawn out of the nostrils again, the loop is pushed up behind the polyp as far as possible. As soon as it is firmly in contact with the pedicle, the outer ends of the wire are passed through the rings, or orifices, of a suitable canula, and attached to a sliding rod upon its handle. This is then drawn home and the pedicle severed. Care must be taken, by keeping the finger upon the polyp, to prevent it from falling down upon the larynx, or into it. Some operators pass a thread through the polyp by which to draw it out through the mouth.

Another method employed is to pass the ends of the wire through a double canula, and merely to strangulate the tumor without attempting to cut it off. The ends of the wire are fastened round little rings at the end of the canula, and tightened from day to day until the tumor drops off. In these cases it would be best to pass a thread, if possible, through the body of the growth, and to secure it to the ear, to prevent its falling into the pharynx or larynx. Cases are on record in which tumors thus removed by the wire have fallen into the pharynx and been swallowed.

Of late years, polyps of the nose have been removed by the galvanic cautery. A platinum wire is passed round the growth and drawn home into a double tube, the extremities of which are in contact with a powerful galvanic battery. As soon as the mass has been constricted the connection is closed, and the tumor burnt through. The difficulty in the operation lies in the adjustment of the snare. Dr. Thudichum,[1] of London, has devised a special apparatus for this purpose, and commends the treatment very highly. It is not accompanied with a great deal of pain or a great deal of bleeding; but it presents the objection that it divides the growth at the point encircled by the wire, and does not draw away the pedicle, as often occurs in the use of the forceps.

When the polyp, from its large bulk, the difficulty of reaching its attachments, or from other causes, cannot be extracted by means of instruments passed into the nostrils, an external operation is necessary for its removal. Access to the parts can be gained by the methods narrated in connection with operations for osseous tumors in the nasal passages.

After removal of a polyp from the nose, resort is made to astringent injections, frequently repeated.

Polyps of the nostrils, when removed, show great disposition to repullulation, not so much, perhaps, from the predisposition of the parts to the formation of the growths, but because it is impossible to remove all the attachments of the growth on account of the shape of the cavity, and these portions develop new polyps after the extraction of the first one. In this way the subject of nasal polyp is often compelled to undergo a series of operations for the removal of these tumors. Riolan is said to cite, in his treatise on anatomy, the observation of an individual who was obliged to submit to an operation of this kind every month, for forty consecutive years.

---

[1] On Polypus in the Nose and Ozæna. London, 1869.

Prof. Gross[1] recommends, in cases where there is great tendency to regeneration of polyps, or where they exist in great numbers, the removal by forceps of half, or even more, of the implicated turbinated bone; a procedure which he has sometimes adopted, and which he believes preferable to the frequent repetition of the ordinary operation.

A Neurilemmatous Tumor occasionally develops in the nostril, and is liable to be mistaken for ordinary polyp. A case of this kind was reported by the Sig. del Greco as having occurred in the Hospital of Pisa.[2] A man, æt. 25, had for about six months been affected with an obstruction in the left nostril, and swelling of the left cheek. On examination it was ascertained that a polypous tumor had formed in the left nostril; and this it was decided to extract, but the surgeon was unable to remove it. A few months afterwards another attempt was made, but with no better success. The patient complained of violent pain during the operation, and said he felt as if the left ear and cheek were being torn off. A few hours after the second operation an inflammatory swelling of the left cheek occurred, but subsided on the following day. Subsequently, a third attempt was made to extract the tumor, but without any effect. Soon after the third operation symptoms of arachnitis took place, of which the patient died on the tenth day. On post-mortem examination, unequivocal traces of inflammation were found in the brain and its membranes. The tumor in the nostril was seated in a branch of the fifth pair of nerves in the following manner: the second branch of the fifth pair, immediately after its passage through the foramen rotundum, was converted into a fibrous mass, divided into five lobes, two of which were of the size of a peach-stone; the three others being smaller, and one of them reaching into the orbit through the spheno-maxillary fissure. The fibrous tumor was situated in the temporal fossa, between the zygomatic process and the great wing of the sphenoid and the upper maxillary bone; the spheno-palatine foramen had become greatly enlarged, so as to admit the little finger, and through it the tumor had entered the nasal cavity, where it had acquired such a development as to resemble a polypous growth. On dissecting the tumor it was found to originate in the neurilemma, and not in the substance of the nerve, which was not at all altered, except by the pressure which had been exerted on it by the enlargement of the neurilemma.

---

[1] System of Surgery.

[2] (*Ann. di Med. Fasc.*, Feb., 1829? 1830?); *Am. Jour. Med. Sci.*, 1831, p. 227.

Adenomas of the pituitary glands occur. A case presenting in a female, æt. 63, occupied the superior and anterior portion of the nasal fossæ of the left side. Prof. Verneuil[1] operated. The nostril was tamponed front and back, and the parts then removed under chloroform; access being gained by a V incision, practised in the sub-orbital and nasal regions.[2] The dorsal decubitus was preserved during the operation, with the face slightly inclined towards the injured side, so that the blood could flow off upon the cheek and not interfere with the operation.

Malignant Tumors involving the Nasal Fossæ.—An examination of the recorded cases shows that malignant disease involving the nasal fossæ usually originates outside of them. An epithelioma which will eventually involve the nasal fossæ, maxillary sinus, frontal sinus, orbit, and other structures, will begin, as in Verneuil's case,[1] by a subcutaneous tumor connected with the bone, and in all likelihood involving it—in this instance situated a little in front of and below the sub-orbital foramen. In four months it acquired an immense bulk. Patient a countryman, æt. 60.

---

[1] *Archives Générales*, Oct., 1870, p. 390: for details, see inaugural thesis of Pugliese, *Essai sur les Adénomes des Fosses Nasales.* Paris, 15 avril, 1862, p. 8 et seq.

[2] A second growth appeared some time after, and was removed by Dr. Bastien.

The disease will involve the nasal bones, os unguis, ethmoid bone, and other structures.

Prof. Verneuil[2] records a case of epithelioma of the inferior eyelid, which during two years invaded successively the cheek, lateral face of the nose, the conjunctiva, and the upper eyelid, penetrating into the orbit, the nasal fossæ, and the maxillary sinus, occurring in a female concierge, æt. 54 and married. In the performance of the operation it was necessary to sacrifice largely the integuments of the visage; and at the same time a portion of the skeleton of the nose and the nasal fossæ. The parts were tamponed and the patient chloroformed. The entire cheek was removed, the globe of the eye, the two eyelids, the greater portion of the superior maxillary and ethmoid bones of the left side; and all without more solicitude and difficulty than usually accompany the extirpation of a superficial cancroid. The patient recovered promptly and gained her ordinary embonpoint and general strength, so that the project was entertained of performing a plastic operation to remedy the deformity. This apparent cure continued an entire year, when a return of the disease manifested itself by the side of the temporal fossa, and slowly produced death without the accompaniment of any severe distress.

Osseous Tumors of the Nasal Fossæ.—Osseous tumors are sometimes developed in the nasal passages, and in the sinuses communicating with them. My main source of information on this subject has been derived from an admirable little pamphlet written by Dr. Paul Olivier, one of the Parisian hospital surgeons, and published in Paris, 1869, entitled "Sur les Tumeurs Osseuses des Fosses Nasales et des Sinus de la Face;" and, in the absence of much other material, I have drawn very largely on its pages for what follows.

---

[1] *Arch. Gén.*, Dec., 1870, p. 394.

[2] *Archives Générales*, Oct., 1870, p. 390.

Dr. Olivier distinguishes the tumors treated of in this essay from other solid tumors which occupy the nasal cavities, by two characteristics:—

1st. They contain in their anatomic constitution only the elements of osseous tissue, spongy or compact.

2d. They are primitively developed in the fibro-mucous membrane which lines the cavities of the nasal fossæ and the sinus.

These two characteristics, the intimate nature and the special seat, enable him to reject from his descriptions polyps enclosing osseous concretions or simply calcareous concretions;[1] ossified sarcomas; those tumors, as yet but little studied, composed of cartilage and bone, like those which Messrs. Trélat and Dolbeau have presented to the Société de Chirurgie;[2] those tumors, described under the name of syphilitic, scrofulous, or other exostoses, which have their point of departure in the bone itself and in the osseous walls of the sinus.

These and still other tumors occurring in the same situation are evidently developed in the bones of the face, and are the result of the various diseases of these bones; while the tumors about to be described are all of one and the same nature. They are developed in the internal periosteum of the sinus; the bone in their neighborhood is not diseased, and if it becomes diseased at a later period it is not because it is invaded by the tumor; it is absorbed, modified in its nutrition as we see it become absorbed, inflamed sometimes by the contact of aneurism; it suffers, in both cases, a similar influence of contiguity.

M. Dolbeau encountered a case in 1864, at l'Hôtel-Dieu, and having collected the observations previously published, read a memoir at the Académie de Médecine, in September, 1866, the conclusions alone of which have been published in the *Bulletin de l'Académie de Médecine*, tome xxxi. p. 1076, 1865–1866, and which are given in the pamphlet of Dr. Olivier. They are:—

---

[1] *Gazette Médicale*, 1868. Fibrome calcifié, observed by M. Bourdilliat.

[2] *Bulletins de la Société de Chirurgie*, 1862, p. 261.

1. The Schneiderian membrane, which covers the different sinuses and cellules communicating with the nasal fossæ, may become the seat of primitive osseous productions, tumors which are independent of the bones of the skull and those of the face, but which may, nevertheless, acquire a very great bulk.

2. We may append to these diverse ossifications the exostosis removed by M. Michon in the maxillary sinus; exostoses of the orbit arising from the ethmoidal cells; the osseous tumor taken from a nasal fossa by M. Legouest; the tumors observed by M. Cloquet, and which he has described as ossifications of mucous polyps of the nasal fossæ; and, also, the recent case of M. Pamard.

3. The membrane which lines the frontal sinus does not form any exception, and sometimes becomes the seat of exostosis; such are the cases of Otto, Roux, Jobert (de Lamballe), Holmes, Coote, and Dolbeau.

4. All these exostoses are always more or less free in the cavities in which they have originated; they may, in their development, become more or less solidly wedged, but they always remain independent of the bone, and they may be removed provided a sufficient opening can be made for that purpose; hence the indication for an early operation.

5. The exostoses of the frontal sinus in particular form no exception, and, despite their vicinity to the brain, these tumors may be enucleated. The development of these tumors being indefinite, it is wise to operate as soon as there is no doubt of their presence, in order to avoid their propagation into the cranial cavity.

6. In the treatment of all these exostoses it is necessary to renounce a direct attack upon the tumor, whether with the gouge or the trepan. None of these instruments can cut a tissue so hard; they become blunt, and the best cutting-pliers of Liston have been seen to break without making any impression upon the tumor. It is necessary, as has already been said, to

open largely the cavity containing the exostosis, and it then suffices to move the entire mass of the tumor from side to side, to see it come away in totality, and without any great effort.

This article was referred to the examination of a committee, composed of MM. Velpeau, Gosselin, and Richet.

In February and July, 1869, two new cases presented themselves in the service of Professor Richet; their observation, from notes taken at the bedside, and at the clinics which Professor Richet made them the occasion of, forms, with that communicated to him by M. Dolbeau, the bases of M. Olivier's pamphlet. In addition to these cases, he has collected some from the records of other surgeons, making eleven in all.

The size of these tumors varied from that of a nut to that of an apple; their weight, from fifteen grammes to one hundred and twenty grammes. The subjects operated upon were of both sexes, and all young, their ages varying from thirteen years to thirty-four. In all of them the disease seemed to have made its appearance early; on the average, between the ages of fifteen and twenty. They were slow in growth, sometimes remaining quiescent for years, and then suddenly taking on a fresh development. As they increase in size they produce great deformity of the visage, dislocating the eyeball if in proximity to the orbit, and inflict a great deal of pain. The symptoms they produce are at first ill-defined, being such as attend inflammations, polyps, and other tumors; sometimes nothing but a sense of weight and numbness in the parts. At other times they provoke pains referred to the teeth, if the maxillary sinus be implicated, or to supra-orbital neuralgia if it be in the frontal sinus. There is also apt to be epistaxis without any appreciable cause. At a later date, when the tumor is increasing in size, the more positive symptoms are produced. The pain varies in character, from occasional intermittent pangs at long intervals, to involvement of all the branches of the fifth pair of nerves, and is most frequently due to compression of the nervous filaments, and is not always proportionate to the size of the tumor, depending rather upon the resistance which the neighboring parts offer to its development, and upon the more or less rapid march of the affection.

When the tumor has attained a sufficient size it can be distinguished from the exterior; and about this period the hemorrhages usually cease. At first they are thought to be due to the congestion of the mucous membrane, produced by the presence of the tumor. Sometimes they are spontaneous, or due to ulceration of the mucous membrane; at other times occur only when the patient picks his nose, or when the surgeon examines the tumor, under which latter circumstance it is sometimes very profuse.

When the tumor occupies the nasal fossæ, it is usually more appreciable than when it is developed in the sinuses. It is generally seen at the anterior portion of the nostrils, colored red when still covered with mucous membrane, or grayish if it has become carious, as in one of the cases reported. It may be touched directly by the finger, and without interposition of any other tissue. If it is in the frontal or maxillary sinus, there is always more or less covering by the soft tissues, which prevents an exact appreciation of its physical properties. Sometimes, however, the integuments undergo ulceration and are destroyed, so that the tumor is directly exposed to vision. In all the observations exophthalmos existed, whatever had been the primitive seat of the tumor. Other displacements and consecutive affections of the eye are often produced, varying with the seat and form of the growth; such as inability to close the lids over the eye, œdema of the eyelids, strabismus, conjunctivitis, chemosis, inflammation and ulceration of the cornea, etc.

There are troubles of respiration, phonation, and mastication.

Whatever may be the seat of the tumor, it has always the same characters—immobility or obscure mobility, osseous hardness in its entire extent. Its surface may be uniform or nodulated, the latter being a special symptom of the eburnated variety. The texture of the tumor is judged of by the touch of the finger and by the use of the exploring needle, which cannot be made to penetrate it except in certain cases of tumors of cancellated tissue, where it is possible to hit upon one of the interspaces limited by the osseous columns of the tumor; and therefore the needle should be applied several times.

In the nasal cavity the tumor is readily examined, either anteriorly or with the finger passed behind the palate, where it may sometimes be felt, generally separated from the pharynx by a greater or less free space. If the tumor has become denuded of its periosteum, it provokes ulceration of the mucous membrane, abscess, and a discharge of sanious fluids which poison the patient by their odor, and by being swallowed with the saliva. In these cases the examination, even when conducted with great care, sometimes produces serious hemorrhage. This loss of blood, suppuration, and poisoning, induce hectic fever, loss of appetite, and so on, under the influence of which the patient will succumb, if not promptly relieved by surgical operation.

These tumors are not removable by direct attack. The eburnated variety cannot be broken or cut by instruments, and it is necessary to prepare a passage from the exterior large enough to admit of their being extracted in bulk. The cellulous tumors, on the other hand, are so friable that they almost always break in the grasp of the instrument when an attempt is made to extract them in bulk. For the one variety, therefore, a very large exterior passage is required, and for the other a smaller exposure suffices. When the friable tumors occupy the nasal passages, it is suggested by M. Ollivier that an attempt be made to crush them, and remove them in fragments, before resorting to any mutilation of the soft parts.

If the tumor occupy the frontal sinus, or ethmoidal cells, it is recommended by Richet to expose it, if small, by an incision slightly convex above, immediately beneath the eyebrow; and if large, by two incisions, meeting at a right angle, as practised by Dolbeau and Maisonneuve. The borders of the osseous tissues, which form a sort of collar about it, are then to be resected, when the tumor can be seized with forceps, and removed by a dislodging motion to one side and the other. In one case, M. Bouyer, in order to remove two exostoses from his patient, broke the anterior plate of the frontal bone to get at one, and was obliged to saw the superior portion of the orbitary ridge to get at the other.

If the tumor occupy the nasal fossa, it has been recommended by Lenoir to make an incision in the middle of the nose, from its base to its point; and by Legouest and Richet to make a curvilinear incision from the angle of the eye to the border of the lip. The flaps being dissected, Richet and Lenoir were able to extract the tumor by resecting the nasal bone of the side it occupied. In the case of Legouest there was a species of constriction in the middle of the tumor that rendered its extraction more difficult. He was obliged to make a fresh incision, perpendicular to that already made, and then to make a temporary resection of the superior maxilla in order to reach the posterior portion of the tumor, which had broken into two fragments.

When the tumor has been extracted, the cavity in which it was lodged is to be examined; any roughnesses that may be due to former attachments of the tumor must be scraped off, and any polyps, which are apt to coexist with the osseous tumor, are to be removed. If the external wound has been extensive, it is united by suture; otherwise its edges are merely placed in apposition, a free opening being maintained for the passage of the products of suppuration, which is almost inevitable.

Recovery is usually rapid, sometimes without any untoward circumstance whatever. In other cases fever, vomiting, erysipelas, and cerebral disturbance retard the convalescence.

As far as present observations go (1869) there has been no return of the tumors thus removed.

An interesting example of exostosis, involving the nasal cavity in connection with the orbit, successfully operated upon by Dr. Alex. B. Mott,[1] of New York, may be alluded to in this connection. The patient was a man thirty-three years of age, and had been affected for some seven years. The growth began as an enlargement, towards the inner canthus of the left eye, attended with inflammation and lachrymation. Previous to this the general health of the patient had been good, except that he had been subject to headache. In eighteen months the left nostril became closed up. Though he applied to surgeons for relief, nothing essential was done until he came under the care of Dr. Mott; the tumor, in the mean time, having increased in size, and pressed the eye outwards.

---

[1] *Am. Jour. Med. Sci.*, Jan. 1857, p. 35 (illustrated).

Two months previous to this time a hemorrhagic discharge had taken place from the left nostril, and continued subsequently, night and day, to a considerable extent. A month after this an abscess formed under the lower lid, towards the inner canthus; and through an opening at this point the bone could be distinctly felt with a probe, and its existence in the nostril was equally evident. Several polypi existed in the opposite nostril, and were removed before the main operation was undertaken.

The operation began with an incision from the ala of the nose, in a direct line upwards, to about half an inch above the superciliary ridge, followed by a transverse incision from the centre of the upper eyelid, across the nasal bone, to the opposite eyelid, terminating in a line with the inner canthus of the eye. The four flaps were then dissected up. On raising the flap nearest the nose, it was evident that a large portion of the osseous mass extended into the nasal cavity, and it became necessary to remove the whole of the fleshy portion of the nose from the nasal bone of that side. The nasal bone was then separated from its fellow by a strong pair of Liston's forceps, and from the frontal bone by a fine, straight flexible saw. A large portion of the mass was then removed by manipulation, and the remainder chiselled from the orbital plates of the frontal and upper maxillary bones, the os unguis being so thoroughly incorporated with the mass as to require removal with it, extraction being accomplished by slight traction with strong forceps. The weight of the tumor was three ounces and one drachm. Erysipelas and fever set in, but were happily subdued, and the patient made a prompt and satisfactory recovery.

TAMPONING THE POST-NASAL FOSSÆ.

In operating on diseases of the nasal region the tampon should be employed before anæsthetizing the patient. If the anæsthetic is administered first, there may be, as reported in one of Prof. Verneuil's cases, great difficulty in tamponing; the jaws may be hard to separate; the tongue is apt to be contracted by the irritation of the canula, and force itself upwards and backwards so as seriously to embarrass the manipulation.

When the occlusion is perfect, so that no blood escapes into the throat, the patient remains perfectly quiet during the operation, without any elevation of pulse, or irregularity of respiration. If the occlusion is imperfect, or becomes so during the operation, the escape of even a small amount of blood into the throat will induce reflex action, which will at once accelerate the pulse, thereby increasing the flow of blood, and interfere with respiration, or even suspend it.

Anæsthesia is recommended in the performance of these operations, because the agitation of the patient, his cries, etc., produce a vascular turgescence of the parts, which increases the amount of hemorrhage; therefore, under the influence of insensibility, there is a much less amount of blood lost.

The entrance of blood into the throat provokes nausea, vomiting, expectoration, and a variety of movements which produce turgescence, and thus tend to increase the hemorrhage.

After bleeding has ceased the tampon should be removed, lest its presence excite irritative inflammation.

If the septum narium is perforated, it will be necessary to tampon both the nasal fossæ, though the operation to be performed concern but one of them.

CHAPTER XIII.

AFFECTIONS OF THE FRONTAL SINUS.

THE frontal sinus is liable to become the seat of various affections; but most of these occur very infrequently, and the little that is known concerning them is to be gathered principally from isolated reports in the journals or in special monographs. Some of these affections are apt to be continuous with affections of the nasal cavities, or dependent upon them. Others appear to originate in the sinus.

Inflammation occurs, sometimes as a result of external injury, more frequently by reason of an extension of disease from the nasal cavities, principally in connection with tertiary syphilis. This produces pain, a sense of fulness in the parts, and more or less serous or mucous discharge from the nostrils. A moderate degree of inflammation of the frontal sinus attends severe cases of coryza.

This is to be combated by the ordinary treatment for inflammation, means being taken to promote the discharge from the nasal passages.

Frequent attacks of this kind sometimes result in permanent distention of the frontal sinuses, which become markedly prominent, accompanied by chronic purulent or muco-purulent discharge from the nose, which, when fetid, forms one of the most obstinate varieties of ozœna, on account of the profuse secretion of the purulent matter, and the difficulty in reaching its source by local remedies. Forcible injections, by means of a long syringe passed high up the nostril, sometimes penetrate into the sinuses, and usually give rise to intense pain in the frontal region, sometimes lasting for hours. The use of the nasal douche in cases of chronic discharge from the nasal cavities also, at times, admits the passage of the fluid into the frontal sinuses, and thus provokes severe pain, necessitating an abandonment of the operation.

The local effects of ointments, applied freely to the nasal mucous membrane, is sometimes propagated by continuity to the lining membrane of the sinuses, and thus enables us to control the pain in the part. I have found an ointment of simple cerate, or lard, in which two or three grains of sulphate of morphia to the ounce has been well incorporated, do excellent service in some painful affections of the frontal sinus.

An abscess sometimes forms in the frontal sinus as a result of inflammation, and finds its way into the nose, and even, in some instances, penetrates the anterior wall of the sinus. Erysipelatous inflammation of the soft parts overlying the sinus, with great local and general disturbance, would usually be indicative of the formation of an abscess; under which circumstances it is recommended to cut down upon the parts, and enter the sinus by means of a small trephine, in order to discharge the abscess.

In some instances a drainage-tube is left in the parts; in other instances a perforation is made into the nasal cavity, and the drainage-tube passed through it, in order to favor the passage of the secretions by that channel. At other times the interior of the cavity is washed out by warm astringent anodyne or detergent lotions.

When the abscess occurs in the course of syphilis, there is danger of caries of the bone and penetration into the cavity of the cranium.

Dr. Soelberg Wells (*Lancet*, May 14, 1870) records the following case of abscess of the frontal sinus. R. S., a baker, æt. 40, had about twelve years before a tumefaction of the upper eyelid of the right side, which disappeared spontaneously at the end of a week, but reappeared about every two years. For the past six months, the patient had noticed at the side of this tumefaction of the eyelid a tumor situated in the internal angle of the orbit, near the root of the nose; which, augmenting progressively, induced the patient to present himself at King's County Hospital, June 14, 1869.

Disease of the mucous lining of the frontal sinus may give rise to the deposit of calcareous concretions, such as are met with in the nasal cavities. The larvæ of insects are sometimes found in the frontal sinus from the development of eggs which have been deposited in the nasal passages, one or two instances of which are given in connection with the subject of diseases of the nasal passages. Other foreign bodies are occasionally found in this situation, sometimes pushed up through the nose, sometimes the result of gunshot or other injury, or of ordinary fracture. The indication would be, in the case of a foreign body, to expose it by external incision and the trephine, in order to accomplish its extraction.

An occlusion of the passage between the sinus and the nasal cavity causes accumulation of mucus, pus, and sometimes blood, eventuating in marked distention of the parts, sometimes producing deformity of the eyeball. Under such circumstances there may be danger of pressure on the brain, or of perforation into the cavity of the cranium. Prompt evacuation, through the nose or externally, is required under this condition.

Tumors of the Frontal Sinus.—Various tumors occur in connection with the frontal sinus. These may be polyps, similar to those in the nasal cavity, cystic tumors, osseous tumors, and malignant growths. Their diagnosis is not easy until by their development they have produced a characteristic deformity.

The symptoms, nature, and treatment of these tumors will be made evident by the subjoined cases selected in illustration.

Cystic Tumor of Frontal Sinus. A case of this kind, occurring in the practice of Prof. Jaeger, is reported[1] by J. W. Brunn. A delicate girl, nine years of age, affected with severe headache, had a swelling in the left eyebrow, gradually followed by impaired sight of the adjoining eye. At fourteen years of age she was first examined by Prof. Jaeger, who found a hard tumor which could be indented by digital pressure, upon the removal of which it resumed its original appearance. The anterior plate was divided, giving exit to a large quantity of bloody serum, and the cavity of the sinus was found divided, by delicate membranes, into numerous cells. Under the impression that the tumor involved the inner table of the frontal bone, it was not further disturbed. Violent inflammation ensued, attended with a discharge of offensive serum. The discharge ceased, the opening healed, and the tumor remained as large as before. The patient did not appear to be benefited by the operation. A seton had been passed through the tumor without benefit, and it discharged daily a large quantity of fetid fluid. She became chlorotic, and died in her fifteenth year.

---

[1] (*Hecker's Annalen*, Mch. 1829). *Am. Jour. Med. Sci.*, vol. 5, p. 203.

It was found that the tumor had encroached upon the caliber of the left nostril, and compressed the antrum of that side. Posteriorly, it had forced the anterior lobe of the brain into the position of the middle lobe. In general, the inner table of the skull was not perforated. The tumor was found to contain numerous cysts, some containing reddish, others bluish, or colorless gluey serum. The extended bony plate was of similar consistence to that of the skull of a newly-born hydrocephalic infant. The dimensions of the swelling were, 5 inches 8 lines long, 4 inches 9 lines broad, and 4 inches 3 lines high.

Cystic Tumor of the Frontal Sinus.—(*Arch. Gén.*, Oct., Nov., Dec., 1870, p. 539, from Étude sur les tumeurs de la glande lacrymale, M. Sautereau, thèse. Paris, 1870, p. 68.) Hydropisie du sinus frontal du côté droit. Ouverture dans l'orbite. Exophthalmos.

M. M——, propriétaire at Avallon, æt. 60 years. Consulted Prof. Richet, November, 1868, concerning a tumor which had produced an exophthalmos of the right side. For many years he had been subject to bleedings from the nose. When these became suppressed, there ensued violent headaches, preventing sleep and throwing the patient into very painful nervous crises. A physician administered mercury and iodide of potassium, under the impression that there was cephalalgia of syphilitic origin, but without securing the least assuagement.

Sometimes, in addition to the blood, there would be discharged from the nose serum, and a material resembling pus. For the past nine months there had not been any nasal discharge Apart from this trouble, the patient had never had any serious illness. He was otherwise strong and well nourished, and his ocular affection did not appear in any way to influence his good state of health.

The eye of the right side was strongly depressed downwards and outwards, so that, taking a horizontal line, the right cornea was situated two centimetres below the cornea of the left side. The upper eyelid was œdematous and elongated, and had to be raised in order to expose the eye. For more than a month, the patient had been unable to distinguish day from night in the affected side. The conjunctiva was puffed up, forming around the cornea a most notable chemosis; the pupil was dilated. This permitted an examination of the fundus of the eye, showing the papilla perfectly healthy, though strongly injected and œdematous-like. The retina and choroid were in a normal condition. The eyeball itself did not appear augmented in volume. That which pushed it downwards and outwards, and which elongated the upper eyelid, was a tumor which seemed to occupy the superciliary fossa, oblong and elongated, like the eyebrow under which it was situated, and which appeared to have thrown off the superciliary ridge several millimetres in front of that of the opposite side.

This tumor was hard to the touch, without elevation or unevenness; but on introducing the finger beneath the frontal bone so as to penetrate the orbital cavity between the plafond of the orbit and the eyeball, there was felt at its middle portion a projection, perfectly round, with a large base placed against the plafond of the orbit, soft, fluctuating, and to a certain point depressible. On compressing it, some liquid contents passed from under the touch, which resumed their position as soon as the compression was discontinued.

The patient experienced but little pain during these various explorations, and there was noticed a slight sensibility of the skin of the brow, determined probably by the compression of the frontal nerves; and finally a complete absence of the shedding of tears.

In consideration of these various particulars, the uniform tenderness of the superciliary arcade, the fluctuating tumefaction with large base at the side of the orbit, the abrupt suspension for six months of the alternative mucous, purulent, and sanguinolent nasal discharge, M. le Prof. Richet considered the case one of those known as hydropisie of the frontal sinus with irruption into the orbit, and, as a consequence, progressive exophthalmia downwards and outwards. He therefore proposed to open the tumor at its fluctuating point, in order to penetrate the frontal sinus, and establish there a drainage tube. After some hesitation, the operation was accepted, and practised December 24th, 1868, in the following manner:

Immediately below the eyebrow, at the base of the superior eyelid, and parallel to the fold of this membranous veil, an incision was made, two centimetres in length, and, after having divided the entire thickness of this eyelid, a cyst was reached whose membranous walls were very much distended. A puncture was made, and there escaped a considerable quantity of a thready fluid, viscous, and of the color of café au lait, a little dark. The opening was enlarged, the finger carried to the bottom of the sac, which, it was found, extended to the remotest portion of the orbit. The bone was not uncovered in any portion of its extent; but on turning the pulpy portion of the finger below and forward, to the side of the superciliary ridge, an opening was encountered, through which a canulated sound introduced through it manifestly traversed the entire cavity of the frontal sinus. A gum tube perforated with lateral openings was introduced and maintained in the opening; and the remainder of the sac was filled with fine charpie saturated with a solution of the alcoholic extract of walnut, to prevent adhesive suppuration.

The next day and the days following, the patient was remarkably well, and did not appear to have suffered the least fatigue from the operation.

Little by little, the quantity of charpie introduced into the membranous portion of the cyst was diminished, and towards the end of January its walls were completely adherent and there remained only the opening which gave exit to the tube of caoutchouc.

Little by little the eye became replaced in its orbit, the upper eyelid becoming raised again. When the patient left Paris, early in March, there only remained a little fistulous opening, furnishing every day a few drops of a ropy muco-pus. The eye had gradually resumed all its functions, repassing in phases analogous to those which had terminated in complete abolition of sight; that is to say, the patient had commenced to perceive light, then soon distinguished objects, and finally could read without fatigue, but on condition of closing the eye of the opposite side. In fact, when he wished to see with both eyes, which were not on the same plane, objects appeared double; but the diplopia gradually disappeared.

Once since this epoch, the opening being occluded, the patient was seized with violent pains, and a slight degree of exorbitism was produced.

He returned to Paris, and Prof. Richet contented himself with forcing in a sound, which gave issue to a little liquid pus which had accumulated, sufficing to allay the suffering.

In case of the reappearance of the phenomena, Prof. Richet intends to perforate the osseous septum which separates the cavity of the nasal fossæ from the frontal sinus, by means of a curved instrument devised for the purpose. This opening will permit the liquid to run directly into the nose, and will oppose an obstacle to any new collection in the cavity of the sinus.

Exostosis of Frontal Sinus.[1]—A young man, æt. 20, of excellent constitution, entered the Hospital Clinic early in July, 1869. The January previous, he remarked that his right eye was more prominent than that on the other side, but there was no suffering or pain in the orbit. For three months there had been some pain, an external strabismus, and a diplopia, which continued for a few days only. There was an abundant lachrymation. There was nothing particular observed at the side of the buccal cavity, or the nasal fossæ.

At his entrance he presented the following condition: the eye completely out of its orbit, and at the same time directed downwards and outwards. The ball of the eye, slightly flattened from before backwards, showed some alterations. The conjunctiva was a little red; it was, especially internally, infiltrated with serosity, as by a slight chemosis. The cornea was affected, some small ulcerations being seen at its external portion. The anterior chamber and the crystalline lens were in a normal condition. Ophthalmic examination showed a little serous effusion of the papillæ, the veins being engorged by some obstacle to the return of the circulation. Nevertheless, vision was preserved. The inferior eyelid was normal, but the superior one was very much distended, and covered the superior portion of the globe of the eye. At the superior internal angle of the orbit there was a marked œdema. By palpation there was found in this region a tumor of the apparent size of a nut, completely immovable and very adherent to the inferior face of the frontal bone, this adherence seeming to be made by a large base. This tumor, covered by the integuments of the face, appeared bosselated, uneven, and of an eburnated hardness. Inwards it extended to the nasal apophysis of the superior maxillary; outwards, to the internal third of the superciliary ridge. It was impossible to limit the tumor posteriorly. A small steel needle forced into the integuments could not be penetrated into the tumor.

---

[1] **Exophthalmie consécutive à une exostose du Sinus Frontal. Arch. Gén. 1870, p. 541.**

In view of all these signs, Prof. Richet diagnosed an eburnated exostosis, having originated in the frontal sinus, and having developed itself at the superior and internal portion of the orbitar cavity.

Prof. Richet incised the integuments at the superior and internal portion of the superciliary ridge. The tumor was exposed, and was adherent to the frontal bone by a large base. With the aid of a gouge it was readily enucleated, and, so to speak, peeled from its surface of implantation.

The author would call attention to a very valuable and elaborate article[1] on Affections of the Frontal Sinuses, which has recently appeared from the pen of Dr. F. Steiner, one of the assistants of Prof. Billroth, of Vienna. It came under the author's notice after the preceding pages were written, and at too late a date for incorporation into them.

---

[1] **Ueber die Entwickelung der Stirnhöhlen und deren krankhafte Erweiterung durch Ansammlung von Flüssigkeiten. Archiv für Klinische Chirurgie. Bd. xiii. part 1, 1871, p. 144.**

CHAPTER XIV.

AFFECTIONS OF THE LARYNX AND TRACHEA.

ACUTE LARYNGITIS.

ACUTE laryngitis is an inflammation of the mucous membrane of the larynx, which, for the most part, comes on suddenly, is severe in character, and of short duration. It occurs not infrequently as an idiopathic affection, the result of sudden or unusual exposure to cold, in an individual subject to attacks of acute sore throat; or in one who has but recently become convalescent from some disease in which the throat had been affected, such as scarlatina, measles, etc. Much more frequently it is met with in the course of the chronic laryngitis attendant upon certain forms of tuberculosis and syphilis, an acute laryngitis from some cause or other becoming superimposed upon the chronic laryngitis already existing.

The most frequent direct cause of acute laryngitis is of traumatic origin, such as the involuntary swallowing of boiling water, or caustic solutions; the breathing of flame, hot vapors, or acrid substances;—the inflammation of the larynx following immediately. The voluntary deglutition of hot or caustic substances with suicidal intent is not apt to be followed by acute laryngitis.

When not of traumatic origin, acute laryngitis is usually ushered in by chilliness, which is quickly followed by fever; sore throat being complained of very early. There is severe pain in the region of the larynx, with tenderness to pressure externally; and there is a decided sense of constriction, as though from a foreign body, or outside pressure. This is speedily followed by dyspnœa and dysphagia. The voice is not always affected, but is usually hoarse, dull and hollow in timbre, though occasionally shrill and piping, and it is emitted with some difficulty, and often only with actual pain, the enunciation of a sentence, or sometimes even a word, being interrupted by wheezing and prolonged efforts of inspiration, symptoms which are very characteristic of constriction, or other mechanical impediment above the glottis. The respiration will be sonorous, sometimes metallic. The cough will be hoarse, deep, hollow, or brazen, like that of croup. As the disease progresses, the fever becomes more intense, the local symptoms increase in severity, the patient exhibits anxiety as to the result, suffocative paroxysms of dyspnœa ensue, the countenance becomes cyanotic, and, unless relief is procured, death soon occurs by suffocation and coma.

The actual amount of inflammatory action present is not usually of very great extent, but the location of the parts involved is such that a moderate amount of swelling, inseparable from the action of inflammation anywhere, interferes seriously with the integrity of the respiratory function; and it is this impediment to respiration, mechanically offered by the swollen mucous membrane of the larynx, that constitutes the grave and serious lesion in this disease.

We may distinguish two forms of acute laryngitis; one in which the inflammatory action is confined more or less to the mucous membrane, and the other in which the inflammation involves the sub-mucous connective tissue, as well as the membrane. This latter form is to be distinguished from the inflammation of the same tissue which occcurs in the course of other complaints, and which will be more directly treated of in the section following.

In the one form of laryngitis, the entire laryngeal mucous membrane is very red and very much swollen. The epiglottis is usually erect, and its mucous membrane is swollen out to two or three times the natural bulk of the organ. In like manner there will be a similar swelling of the mucous membrane of the aryteno-epiglottic folds, arytenoid cartilages, corpuscles of Santorini, and ventricular bands, and sometimes even of that of the vocal cords. This swelling is sometimes so great as to leave but a very small, irregular opening free for the passage of air; and it will impede greatly the motion of the parts, so that the patient will not be able to dilate his glottis to its full extent.

In consequence of this condition of things, there is great danger of a speedy termination of the patient's life by suffocation, before there has been time enough for the parts to pass through the regular course of inflammation towards resolution on the one hand, or suppuration on the other. The disease, when not fatal, usually continues from seven to ten days. I have occasionally seen it, however, run its entire course in from twenty-four to forty-eight hours; and there are instances recorded in which it continued for from twelve to twenty-four hours only.

In mild cases of this disease, and they occur more frequently than is usually known, there is very little swelling of the parts. The entire mucous membrane of the larynx will be fiery red, the pain severe, the cough brassy, the voice rough, hoarse, or piping, but there will be no impediment to respiration, and but little to deglutition, and this more from the pain exercised upon the inflamed structures than from any actual obstacle offered on the part of the epiglottis and arytenoid cartilages.

In the second form of acute laryngitis, where the sub-mucous connective tissue participates in the inflammatory action, in part or in great measure, we will have additional swelling to that already mentioned above, from serous infiltration into this sub-mucous connective tissue, and we will have all the symptoms, and recognize the appearances, to be described in the article on œdema of the larynx. It is not mere violence of inflammation that produces this form of the affection, for in some instances the acceleration of the pulse, heat of skin, nervous disturbance, and other phenomena of the accompanying febrile excitement, will be much less than in the form of laryngitis confined to the mucous membrane. On the other hand the local symptoms will be much more severe, and appeal more loudly for prompt relief.

In the treatment of acute laryngitis it is essential to make a proper diagnosis at an early date, and to treat it promptly and efficiently, bearing in mind that it is an acute disease, rendered dangerous not from the violence of its action, but on account of the locality which is invaded; and that, for this reason, local treatment takes precedence of general treatment. The laryngoscope is here of the greatest service, both as a means of accurate diagnosis, and as permitting the efficient application of local measures.

The systematic treatment of inflammation by venesection—the external use of leeches, the internal administration of remedies acting upon the various emunctories—is not applicable here as in inflammation elsewhere, because we dare not always wait for the action of these measures. In mild cases, the external application of leeches, the use of salines, and the inhalation of the steam of warm water, or of astringent solutions, will be of great benefit, and be thoroughly efficient, with perfect rest, quiet, and silence. In severe cases, especially where there is œdema, early scarification of the parts, by the method to be described in a later part of this volume, will be of immense service. By this procedure the parts are at once disgorged of their blood; the serum is discharged from the tumid swellings; the local symptoms are promptly relieved, and respiration is rendered efficient for the purposes of the economy in her own efforts at cure. It is rarely that a second scarification becomes necessary.

Where scarification is inapplicable from want of appliances, want of practice, or other causes, the trachea should be promptly divided, that the lungs may receive a due supply of air to enable the system to pass through the natural stages of the inflammatory process. This operation of tracheotomy must not be delayed too long, but should be performed at the very first moment that the impediment to respiration is recognized as serious. Delayed too long, the blood will have become so poisoned by carbonization that the relief to respiration will not be followed by efficient oxygenation, and the patient will succumb a few hours after having been relieved of the local symptoms. This is the history of many cases who perished after tracheotomy, because it had been postponed for a last resort, when, if resorted to early, the probability is that it would have saved life in at least some of the instances.

In the acute laryngitis of traumatic origin there is an element of complication from the destruction of tissue which is produced by the accident. In idiopathic acute laryngitis, ulceration is rare, and is usually encountered only in persons whose health has been seriously impaired by previous disease. Another complication, moreover, in traumatic laryngitis which must not be lost sight of, is the formation of abscesses which require opening,—an addition to the treatment already described. These abscesses usually form in some part of the larynx near the point of injury; but they may occur in the structures adjacent to the larynx, and may dip down the sides of the throat, and even penetrate the tissues of the neck so as to present externally.

Disease of the cartilages is not frequent in acute laryngitis. Occasionally special portions of the larynx are the seat of acute inflammation, without active participation of the adjacent structures. These local inflammatory processes have been termed epiglottitis, chorditis vocalis, etc., to designate the special seat of the inflammation. They are recognized by laryngoscopic inspection, and are to be treated in the same manner as acute laryngitis of a mild type affecting the entire organ. If great swelling or œdema take place, scarification will be demanded.

Although the severe symptoms of acute laryngitis continue for a few days only, convalescence is occasionally very tardy, a subacute catarrhal laryngitis sometimes lingering behind for weeks.

ŒDEMA OF THE LARYNX.

Under certain circumstances, a serous or sero-purulent infiltration takes place with more or less rapidity into the submucous connective tissue of the upper portions of the larynx, and chiefly upon their inner surface. The result is first to impede respiration, and subsequently to obstruct it; and if the condition does not soon subside spontaneously, which rarely happens, or is not promptly relieved by surgical interference, the patient perishes in a period varying from a few hours to a few days.

The most frequent seat of the affection is in the aryteno-epiglottidean folds; and both of them are usually implicated. Sometimes an effusion occupies the structures of the epiglottis at the same time, and sometimes it is confined to the epiglottis. Occasionally it implicates the lips of the glottis, converting them into thick obstructing pads, but the infiltration under these circumstances occurs in the tissue of the thyro-arytenoid muscle itself, rather than beneath the mucous covering of the vocal cord. To this class of cases alone should we restrict the term œdema of the glottis:—a term unfortunately too generally employed to denote every other œdema of the laryngeal structures also. At times the œdema will spare the upper portions of the larynx, and be confined to the tissue immediately below the vocal cords, and under such circumstances the condition is designated as sub-glottic œdema of the larynx; a form of the affection to which attention was first prominently directed by Dr. Gibb,[1] who narrates several instances, and enumerates some pathological specimens.

Until the present century the pathology of this disease was misunderstood. Its symptoms were usually inferred to be denotive of croup in the adult; for although the affection has been known to attack the infant at the breast, and even, in one reported instance, a new-born babe; and, on the other hand, to make its appearance in extreme old age (a case being reported as occurring at 81), it is usually encountered in early and middle adult life.

The illustrious Washington perished in 1799 by this affection, after an illness of but little more than twenty-four hours. Porter[2] mentions that one of the physicians who lost his life by it in 1808, declared that his disease was to be considered as croup. It was in this same year, 1808, that M. G. L. Bayle communicated his famous paper on œdematous laryngeal angina to the Society of the Parisian School of Medicine; previous to which time, however, Morgagni, in his letter on serous apoplexy, and afterwards Bichat, had described the post-mortem appearances of infiltration of the aryteno-epiglottic folds, which had not been detected before death; and at a still earlier period symptoms of a disease which must have been the same thing, had been recorded without any evidence of a knowledge of the peculiar lesion which had given rise to them.

Œdema of the larynx sometimes occurs in the progress of ordinary acute laryngitis, and constitutes the chief source of immediate danger in that complaint. It is also often present in the traumatic laryngitis caused by the accidental deglutition of hot liquids or caustic solutions, but is not produced when they are voluntarily swallowed in suicidal intent.

---

[1] On Diseases of the Throat and Windpipe. 2d edition, London. 1864, p. 211 et seq.

[2] Observations on the Surgical Pathology of the Larynx and Trachea. London, 1837, p. 79.

When idiopathic, it is more frequent in men than in women, and in free-livers than in persons of more temperate habits.

It also occurs sometimes in the course of pharyngitis, whatever may have been its origin; occasionally, too, in the stridulous laryngitis of children.

It sometimes makes its appearance suddenly during the course of other maladies, and is not confined to such as are ordinarily accompanied by affections of the throat.[1] It is most apt to occur in the waning stages of disease, in the stage of convalescence, or defervescence rather, probably from want of due care as to protection from exposure to currents of air. Thus it has been encountered in scarlatina, measles, smallpox, erysipelas, typhus fever, typhoid fever,[2] Bright's disease of the kidney, whooping-cough, pulmonary catarrh, pneumonia, and in diseases of organs productive of anasarca.

It is sometimes produced in the course of chronic laryngitis of tuberculous and syphilitic origin; in the pharyngitis accompanying malignant disease of the tongue, pharynx, and œsophagus, whether directly implicating the larynx or not; in glandular and other tumors in the cervical region; in aneurism of the arch of the aorta; and in cases of wounds and other mechanical injuries of the throat and parts adjacent. It also occurs in connection with the sore throat of smallpox, and may prove fatal.

Although occurring in persons in good general health, it is more apt to make its appearance in those of broken-down constitutions, or recently convalescent from acute disease; and in most instances there would appear to be some peculiar predisposition, the nature of which is not understood; for there are instances on record of more than one attack in the same individual.

---

[1] Dr. Farre records a case suddenly supervening in a case of jaundice from obstruction of the hepatic duct.—*Lancet*, April 21, 1860, p. 393.

Dr. W. Moore records the case of a medical gentleman suffering under abdominal aneurism, in whom temporary and recurrent aphonia was found by Dr. Smyley to be due to œdema of the vocal cords.—*Dub. Quart. Jour.*, Aug., 1869, p. 13.

[2] In this connection, a valuable paper from the pen of Dr. Emmet can be consulted with advantage.—*Am. Jour. Med. Sci.*, July, 1856.

Under all circumstances, the immediate exciting cause seems to be exposure to cold and moisture.

The symptoms are marked, and in most cases come on more or less suddenly, and increase in severity with great rapidity. There is usually more or less tenderness, which only in some cases amounts to actual pain, with a sense of constriction in the throat as from the presence of a foreign body there; difficulty of inspiration sometimes accompanied by a whistling or stridulous sound, and increasing, as the disease progresses, to all the phenomena of impending suffocation; cough to a greater or less degree, which is often ineffective; feebleness, hoarseness, or extinction of voice; more or less dysphagia, which sometimes amounts to complete inability to swallow, in some instances of which the attempt to swallow has been immediately productive of a fatal issue.

Inspection of the throat usually reveals more or less inflammation of the structures under sight, and sometimes infiltration of the palate, uvula, tonsils, and occasionally even of the pharynx; but very often no evidence of the disease is apparent in the throat. The infiltration of these parts is most apt to occur in œdema, the result of acute inflammation.

Laryngoscopic inspection, where possible, and it is usually practicable in skilful hands, reveals the nature of the lesion at once. Exploration with the finger is almost always applicable, and permits the detection of the swollen structures, as far as regards the implication of the epiglottis and the aryteno-epiglottic folds. Care must be taken in this digital examination, on account of the liability to suffocation. Prof. Trousseau mentions[1] a case in which he induced in this way a suffocative paroxysm which he was afraid would prove fatal.

When the epiglottis is involved, it can very often be perceived on pressing down the tongue, and usually appears as a bladder-like eminence projecting above the base of that organ, varying in size from that of a peanut, which it not unfrequently resembles in shape, to that of the bulk of a walnut; and it is occasionally, as in two or three cases seen by the writer, constricted in its central portion by the glotto-epiglottic ligament, giving the appearance of two bladders instead of one. Occasionally the swollen aryteno-epiglottic folds can be brought in sight by titillating the base of the tongue so as to produce an effort of retching, which raises the entire larynx; but when the epiglottis is swollen they are less apt to be brought in sight.

---

[1] Clinical Medicine. Translation, vol. iii., p. 98.

Viewed in the laryngoscopic image, the appearances of œdema of the larynx are very characteristic. A pale reddish, or sometimes yellowish translucent swelling, irregularly globular or oval in outline, in general appearance not unlike that of an œdematous prepuce, or œdematous eyelid, is found occupying the aryteno-epiglottic folds, usually both of them, though not always in equal extent, and sometimes occupying one side only. These swellings project towards each other, narrowing the laryngeal entrance into a mere slit, which becomes smaller during inspiration from the pressure of the air upon the swellings, so that sometimes the surfaces adhere, slightly pressing them together, while during the passage of the expiratory current they are more or less separated, and sometimes permit a view of the parts below. Usually all distinct appearance of false vocal cord is obliterated, the entire mass, ary-epiglottic fold and ventricular band appearing as one structure. The parts do not present a very vascular aspect, and are sometimes more or less covered with masses of mucus. When the epiglottis is affected, it is seen as a huge mucous bag of limpid fluid overhanging the laryngeal entrance, and often preventing a view of the interior. Sometimes the laryngeal face is not implicated, but the lingual surface and crest is almost always affected. When the disease does not occupy the upper portions of the larynx, the lower portions are seen to project laterally as œdematous swellings.

This affection is of a very serious nature, on account of the liability to suffocation. This has been known to occur at the very first attack, before there had been any opportunity of establishing a diagnosis. Hence it is essential to be able to recognize the condition promptly, and to treat it efficiently, for temporizing treatment may sacrifice a patient who ought to have been saved. Usually, however, the paroxysms subside spontaneously, leaving intervals of impeded respiration. This is at first confined chiefly to inspiration, on account of the pressure inwards of the tumid folds of membrane by the atmospheric current; but, if the disease progresses, expiration will be impeded also.

Where the œdema is dependent on acute disease, the paroxysms will be abrupt, violent, and occur irregularly at intervals of a few hours. When the result of chronic disease, the dyspnœa gradually increases until it culminates in a paroxysm of suffocation, which passes off with more or less relief to the dyspnœa, to recur, as the disease progresses, in the course of a few days, or perhaps a few weeks. Finally, however, these intervals become shorter, until several paroxysms occur within the twenty-four hours, being as a rule more violent at night than in the daytime.

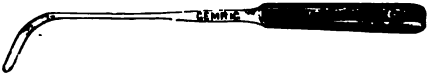
In sub-glottic œdema the breathing is still more stridulous, much like that of laryngismus stridulus; but certainty of diagnosis can be secured only by laryngoscopic examination, when the projecting pads of tumid mucous membrane are seen beneath the vocal cords, and encroaching on the caliber of the larynx. There is usually a more copious secretion of mucus than in supra-glottic œdema, where there is sometimes hardly any, and this mucus contains more or less fibrin. In some of the cases recorded by Dr. Gibb, the contents of the œdematous tumors were essentially fibrinous, and simulating new growths.

The best treatment for this condition is efficient scarification of the tumid swelling. This gives egress to the pent-up fluids, and usually arrests the threatening symptoms at once. This may readily be done with a long curved bistoury, protected to within a line or two of its point, and directed to the parts by the guidance of the finger upon the swelling, or upon the epiglottis. Prof. Buck, of New York, has devised[1] an excellent knife for this purpose (Fig. 62), which, if at hand, is to be preferred to the bistoury. When the laryngoscope is employed, the laryngeal knife offers a more secure method of operating, and with less danger of wounding parts that should not be cut into. The spasm produced is usually insignificant. There is not a great deal of bleeding as a rule, a drachm or two perhaps, and sometimes hardly any; but occasionally, as has happened in the writer's experience, the bleeding has been profuse, requiring the most assiduous efforts on the part of the patient to expectorate the blood flowing down the larynx, so that, despite the relief to the general dyspnœa, the patient has had to cough for his life; and in one instance, where œdema of the aryteno-epiglottic folds had ensued suddenly during a laryngitis of syphilitic origin, it required the external and internal application of ice for many minutes to restrain a bleeding of really alarming character; so that tracheotomy was determined upon in case of a return of the œdematous condition, which fortunately did not take place. Where the bleeding is but slight, it should be encouraged by warm water or the inhalation of steam. Scarification of the external portion of the folds, or their external edges, is not liable to this objection of excessive hemorrhage, and has been resorted to by the writer in two or three instances occurring more recently, and with satisfactory success. After the scarification, the parts present a wrinkled appearance, with bloody marks of the incisions, as examined with the laryngoscope.

---

[1] Œdematous Laryngitis, etc., *Trans. Am. Med. Ass'n.*, Vol. i. p. 135 et seq.; illustrated.

Fig. 62.



Buck's knife for scarifying an œdematous larynx.

In cases of acute œdema, a second scarification is rarely requisite, especially when the progress of the affection can be watched with the laryngoscope; but where the œdema occurs in the progress of chronic affections of the larynx, the operation may be required again and again.

Where the symptoms are very urgent, that is to say, where death is imminent at the moment, the proper procedure would appear to consist in opening the trachea without delay.

This does not always succeed in rescuing the patient. Two cases of this kind, followed by fatal results, are recorded by Drs. Pitman and Page.[1]

The trachea is to be opened in preference to the larynx, in consequence of its greater distance from the seat of the disease, and the lesser liability to protraction of the complaint, as well as for the reason that the disease may be extending low down in the larynx, and therefore exist at the very seat selected for an opening into the larynx. Life being thus saved, scarification of the œdematous structure may be pursued with more deliberation. Under circumstances of great urgency, an opening must be made below into the trachea with the pocket-knife, if no surgical instrument is at hand, and without any dissection, the delay for which may result in the loss of the patient. The case is so desperate as to be rescued only by desperate means.

Prof. Stromeyer recommends bursting the bladder-like swelling by a smart stroke of the finger at the moment of examination. The epiglottis, when involved, may thus be firmly pressed against the root of the tongue, and would be very apt to suffer rupture of its mucous membrane under a powerful stroke from the finger. Where this can be done it would appear to be more desirable than scarification, at least in the first instance.

Where pressure or scarification fails to give immediate relief, tracheotomy should be resorted to at once, for the disease threatens death by suffocation before any impression can be made by ordinary antiphlogistic remedies; although it is due to it to say, that cases have recovered under general antiphlogistic treatment;[2] and one, in particular, reported by Dr. Roberts,[3] is interesting from the fact, that the subject died in a subsequent attack fourteen years afterwards. Frequent pressure of the parts, with a view to absorption, is hardly worthy of mention as a method of treatment; and catheterism of the larynx, more honored in this connection by breach than by observance.

---

[1] *Lancet*, April 21, 1860, p. 392.

[2] Vide *Med.-Chir. Trans.* Vol. v., p. 156, Mr. Wilson. *Ibid.* vol. ix., p. 31, Dr. Arnold *Edinb. Med and Surg. Jour.*, vol. x., p. 284, Mr. Anderson.

[3] *Med.-Chirurg. Trans.*, vol. vi., p. 135.

Prof. Trousseau[1] has recorded a severe case of œdema of the epiglottis and ary-epiglottic folds, which was promptly relieved by inhalations of tannin; and a couple of instances in which narcotic inhalations had a very happy effect have been related elsewhere by the writer.[2] But treatment by inhalation must be very rarely applicable, and not at all so where the symptoms are urgent. In one of the author's cases referred to, it was not employed with the hope of a favorable result, but as a means of temporary alleviation while in quest of an instrument for scarification.

Sub-glottic œdema demands the performance of tracheotomy, if the effusion cannot be promptly subdued by the use of constitutional measures, and the inhalation of steam, astringent sprays, etc.; scarification being, on account of the situation of the infiltration, almost always impracticable. If delayed too long in this form, even tracheotomy may be impotent to save the patient, an unfortunate case of which kind occurred a few years ago in the author's practice.

The œdema which occurs during the progress of chronic laryngeal disease usually comes on gradually, rarely insidiously, and may continue for several weeks and even months without producing any suffocative symptoms; and this even when the entrance into the larynx is very much obstructed by the swelling. It seems as if the system gradually accustomed itself to a narrowing of the air-passages on the one hand, while on the other, the general ill-health of the patient and the lack of active exercise seems to make less demand for a large supply of atmospheric air. Certain it is that an amount of œdema is tolerated in chronic affections of the larynx, which would produce symptoms of intense dyspnœa if it occurred suddenly.

The laryngoscope furnishes the only certain means of diagnosis in these cases.

The œdema is more apt to be confined to one side than in the acute variety, probably because the laryngeal affection is one-sided.

---

[1] Clinique Médicale de l'Hôtel-Dieu. Paris, 1861, p. 475.

[2] Inhalation; its Therapeutics and Practice. Philad., 1867, p. 138.

In these cases the condition is often due to disease of the laryngeal cartilages which have become carious; and the necrosed cartilages are productive of laryngeal abscesses on their way to the exterior,—here, the interior of the tube; and sero-purulent secretion will take place in the adjacent submucous connective tissue, producing the phenomena of laryngeal œdema. The cricoid cartilage and the arytenoids are the most prone to become diseased in this manner; but the other cartilages possess no immunity. Sometimes the detached portions of dead cartilage are expectorated in coughing, and there is rapid abatement in the urgency of the dyspnœatic symptoms; but without any real progress towards cure of the disease. It is only occasionally that the sequester can be seen by means of the laryngoscope, and detached with forceps; and if any difficulty in detachment presents itself, tracheotomy may be necessary, if the integrity of the caliber of the tube is threatened.

Opening the trachea for the purpose of setting the larynx at rest in chronic affections,[1] as was formerly advised in certain quarters, is not justifiable; for the affection terminates in death, and the respite is hardly worth its cost. Scarifications, followed by the local application of astringent solutions, including, as such, solutions of nitrate of silver, chloride of gold, chloride of zinc, and the like, with emollient and narcotic inhalations, constitutes perhaps the best treatment. Blisters and other external counter-irritants rarely do good, and are often productive of injury.

In illustration of the immense value of the laryngoscope in determining the exact condition of parts in œdema of the larynx, and thus watching the effects of remedies, the two cases following, from several recorded in the author's note-books, may be instanced, in which the prompt institution of local antiphlogistic measures controlled the progress of the disease, which, under other circumstances, would probably have increased in severity, and perhaps have demanded the performance of tracheotomy, or, at least, of scarification.

---

[1] Porter, "On the Larynx and Trachea," p. 118, states that several cases have been published strongly exemplifying the value of this practice with the view of placing the larynx in that state of quiescence so necessary to the healing of a sore anywhere.

Œdema Laryngis.—Mrs. E. S—— applied at 9 P.M. on the night of April 14, 1866, on account of great oppression in breathing, which had gradually supervened on exposure to cold some forty-eight hours previously. The palate and arches were inflamed, as was also the larynx, and both ary-epiglottic folds were in a marked state of œdema. The symptoms were severe, but not urgent. Pure sulphuric ether was projected upon the parts by means of the hand-ball spray producer, and the patient was then made to inhale from Siegle's steam-nebulizing apparatus an ounce of a saturated solution of chlorate of potassa. On the following day she was, to all intents and purposes, relieved from her distressing symptoms. There was still a little hoarseness, but there was no longer any obstruction to respiration. The larynx was still congested, but the œdematous condition of the folds had almost completely subsided. A douche of sulphate of zinc, fifteen grains to the ounce of water, was propelled upon the parts several times, which completed the treatment in a satisfactory manner.

Œdema Laryngis cured by Alum-Water.—Mrs. F——, æt. 40, applied to me June 1st, 1866, with œdematous infiltration of both arytenoid cartilages and ary-epiglottic folds. Frequent inhalations of the spray of strong alum-water promoted the resorption of the effusion in forty-eight hours. A year or two afterwards, this patient applied again, with an œdema which had progressed as far as on the previous occasion, and it was promptly subdued by the same means.

CHRONIC LARYNGITIS.

Chronic inflammation of the larynx is apt to occur during the progress of chronic pulmonary phthisis; as one of the later manifestations of syphilis; as an accompaniment of carcinomatous disease; as the result of long-continued irritation from minute particles of extraneous matter inhaled by accident, or in the course of special employments; as an extension of bronchitis and tracheitis; as the result of frequent attacks of catarrhal laryngitis; and, very rarely, as a sequel to acute laryngitis. Sometimes an apparently idiopathic case of chronic laryngitis is encountered, without being referable to any particular cause of initial disturbance.

Chronic laryngitis, however produced, is liable to terminate in ulceration of the mucous membrane, producing the condition designated as ulcerative chronic laryngitis. In some respects these forms of the disease vary, but in very many they are alike, as to the seat and appearance of the ulcerations.

The chronic laryngitis without apparent cause, which, for convenience, may be styled idiopathic, is the least liable to take on ulcerative action.

In most instances, the trachea participates in the inflammation more or less extensively; and in some there is also an inactive inflammatory condition of the pharyngeal and nasal mucous membranes, which is sometimes antecedent to the laryngeal affection, and sometimes subsequent to it.

As seen with the laryngoscope, the mucous membrane of the parts involved is always more or less congested, and the color varies from a mere deepening of the normal-pink or red, to a deep-red, brownish-red, and in some cases a purplish-red. Enlarged superficial veins are sometimes seen coursing upon the surface, very often confined to the epiglottis, though sometimes observed upon the ary-epiglottic folds, and occasionally on the vocal cords themselves.

Very often the membrane has also a velvety appearance, and looks as if it were thickened or indurated. The vocal cords do not always participate in the general condition; their color often appearing even whiter than natural by the contrast. They are usually involved, however, and then they will be of a pink-color, from which they may vary to a red as intense as that of the other portions of the larynx. The cartilages of Santorini are very apt to be unusually prominent, with clubbed globular outline, and very red in color; and if there be any deposit of mucus it is apt to be seen in the inter-arytenoid fold of membrane at their base. Clumps of mucus sometimes collect upon the ventricular bands, and also adhere to the vocal cords, stretching often in viscid strands from one side to the other. The vocal cords are very apt to be thickened at their edges, even when not much changed in color. In some instances, the entire interior of the larynx is bathed in a glairy mucus. The epiglottis is very likely to show some erosion upon its edge, even when no similar appearance can be detected elsewhere. When the trachea is involved, the membrane covering the rings is reddened, and the color of the intermediate portions deepened into a darker red.

In severe cases the mucous membrane is ulcerated, and usually in several places; most frequently perhaps upon the posterior laryngeal wall, the ary-epiglottic folds, and upon the posterior portions of the vocal cords; and upon these localities we sometimes discover small irregular papillary excrescences, usually proliferations of pavement epithelium; sometimes of connective tissue elements.

The epiglottis is often thickened, sometimes to four or five times its normal dimension; sometimes it appears to be softened and flaccid, and not unfrequently has undergone some alteration in shape, with loss of symmetry. In other cases it is nodulated and spongy in appearance. After a certain length of time, more or less ulceration occurs in various parts of the mucous membrane, but chiefly in tuberculous and syphilitic cases.

There are no specific appearances distinguishing syphilitic ulceration from that occurring in tuberculosis. The edges of the ulcer, in syphilis, are perhaps more frequently sharp in outline, the surrounding tissue redder in color, and the superficies of the ulcer less regular in appearance. The additional elements of each case must be duly considered to arrive at a differential diagnosis. Ulcerations not unfrequently invade the epiglottis at its base, or are studded irregularly along its laryngeal face, and then are apt to be deeply excavated, even in tuberculous cases.

The evidence of ulceration in the trachea is sometimes recognized with the laryngoscope, but, seen as it is in perspective, it affords a vague idea only of the extent to which this ulceration may have progressed. The post-mortem appearances often exhibit a much greater amount of destruction than, from the laryngoscopic appearances, was supposed to have existed during life. Care must be taken not to mistake as ulcers little clumps of mucus adhering to the various parts. The application of a moistened sponge or of a shower of warm-water spray will often detach the mucus and show the membrane beneath to be unabraded. The ulcers are almost usually covered with a grayish or ash-colored pus, which presents great variety of appearance, and upon its forcible removal, by compression with a bit of sponge, the ulcers almost invariably bleed, but not freely. These ulcers are sometimes of very great extent, and when near the points of articulation of the cartilages with each other and with the vocal cords, are apt to be connected with necrosis of the cartilage from ulcerative perichondritis, which has usually preceded their formation. In tuberculous cases the ulcerations heal slowly, and often reappear in the same or other situations. The syphilitic ulcer, when once cicatrized, is apt to remain healed. Ulceration without constitutional taint heals readily and permanently, as a rule, under judicious management.

Besides the accumulations of mucus in the interior of the larynx proper, there is almost always to be observed an accumulation of mucus, or mucus and saliva, in the pyramidal sinuses just outside the lateral walls of the interior of the larynx, and in the valleculæ between the tongue and the epiglottis. Sometimes these parts participate actively in the diseased condition, and are seen to be inflamed and even ulcerated. Ulcers in these locations seem to be more amenable to treatment than the intralaryngeal ulcers. By and by, as the disease progresses, it is almost certain to involve the pharynx, palate, and all the adjacent structures, if they have not become affected early in the complaint; and ulcerations occur here of the same character as within and about the larynx.

Deposits of the products of inflammation occur in the submucous tissue of the laryngeal mucous membrane, and this to such extent sometimes as to compromise the maintenance of the caliber of the tube. They are most frequent below the glottis, but may involve the lips of the glottis itself, and also those portions of the larynx above it. This produces a condition known as stenosis of the larynx. A condition of stenosis also occurs, sometimes, as a consequence of the cicatrization which takes place upon the healing of ulcerations, or of parts which have suffered injury in cases of wounds or fracture of the larynx.

The symptoms of chronic laryngitis, at first, are usually altogether inadequate to explain the amount of disease present, even in cases of ulceration involving the vocal cords; unless there is extensive ulceration of the epiglottis, giving rise to dysphagia. In ordinary cases there exists only a disagreeable sense of uneasiness, with moderate hoarseness and a sense of tickling, which induces an irresistible desire to cough. There is usually a copious discharge of mucus or muco-pus, which, in ulcerated cases principally, is sometimes streaked with blood. The expectoration is usually most copious in the mornings, from accumulation during night.

As the disease progresses these symptoms become gradually more and more distressing; the general system becomes affected with irritative fever, which often assumes the periodical character and is accompanied by diaphoresis; the pulse rises to 90, 100, 112, 120 beats in the minute, and keeps there. Symptoms of gastric and intestinal disorder supervene. The cough becomes more troublesome, painful, and of longer continuance; the paroxysms of cough, towards the last, bathing the patient with sweat, and producing great debility, so that finally effective coughing is often impossible. The dysphagia becomes intense as the ulceration of epiglottis and top of larynx increases in extent, so that, in many cases, deglutition finally becomes impossible, usually first as regards fluids, and afterwards with solids also. Everything swallowed is painfully regurgitated, and the thirst cannot be allayed by ordinary means, so that the patient often perishes from actual starvation.

The pain, especially when the epiglottis is deeply ulcerated at the side, runs into the ears, so much so at times that the patient complains much more of the pain in the ears than of that in the larynx; and this is increased by swallowing or by local applications, and is dependent on irritation of the auricular branch of the pneumogastric nerve, probably from undermining of the tissues in its neighborhood by extension of the ulcerative process outwards towards the pharynx.

The voice, which at first is perhaps natural, becoming husky only on exertion, gradually becomes habitually hoarse, and may eventually become extinct. The character of the voice, however, does not depend upon the amount of disease present in the vocal cords, as much as it is generally supposed to do. The voice is sometimes perfectly natural when the cords are quite red in color; and often remains tolerably good when there is a considerable amount of ulceration upon them. Thickening of the vocal cords from interstitial deposit, and not from vascular turgescence merely, always produces hoarseness; and their destruction by ulcerative action entails aphonia.

Hoarseness is sometimes present to a marked degree with very little evidence of disease in the cords themselves. It is probable that a paralysis occurs from deposition of inflammatory products between the fibres of the laryngeal muscles; and sometimes from local irritation of the terminal filaments of the nerves of the larynx. Under these circumstances it will be understood why a diminution of the dysphonia, so often presenting in chronic disease of the larynx, or a return of voice, as it is called, is by no means indicative of an improvement as regards the local progress of the disease; and this will be found an important element regarding the prognosis.

On the other hand, the vocal cords may be deeply congested without producing a marked degree of hoarseness, and merely moderate hoarseness may ensue upon extensive ulceration of the tissues of the cords. The character of voice, therefore, cannot give any certain indication of the condition of the vocal cords, which is to be learned only from laryngoscopic inspection.

Many cases of chronic laryngitis appear to occur without being preceded by the acute disease in any of its forms. The story will run, if the patient was, or remains, otherwise in comparative good health, that without exposure to cold, or any other accountable cause, there gradually arose a recognition that there was some slight trouble in the throat. An occasional and often momentary huskiness of voice in speaking, an occasional expectoration of a little pellet of glairy or viscid mucus, with a sense of dryness in the throat, leading to frequent insalivation, and now and then a slight sense of impediment to respiration at night, the patient being awakened by a sense of suffocation, as if the epiglottis had become wedged across the pharynx, a sensation readily relieved by swallowing saliva or a draught of water. These, perhaps, would be all the inconveniences that the patient would be conscious of, and they might occur so seldom that they would hardly attract notice when they were not present. Then, after a while, soreness supervenes, or occasional pains with increased expectoration, perhaps with entire subsidence of the strangulating spasm, and partial subsidence of the state of dryness. In some cases there is increased dryness.

In this state the patient may remain for years, his general health unimpaired, and, the condition of chronic laryngitis having become constitutional, suffering but little with his throat, except when the symptoms of his disease were exasperated by over-exposure, over-work, or over-indulgence.

There is a form of chronic laryngitis sometimes met with, most frequently in young adults between twenty and thirty years of age, which, although attributed by the patient to a severe cold, or sore throat, as the initial disturbance, seems rather to be due in great part to over-feeding, accompanied usually with the abuse of condiments. At any rate it appears to be kept up by this habit. The free use of alcohol, though indulged in in many of these cases, is not an essential factor in the production of the affection, for it is encountered in a marked form in individuals altogether unaccustomed to the use of stimulants. In these cases, there is usually a dusky hue of the skin, and perhaps the presence of sebaceous follicles or pimples on the forehead and sides of the face. The general health is good, unless we except a tendency to costiveness, occasioning resort, now and then, to laxatives. The skin is moist and the extremities warm. The pulse is usually full and slow. The tongue is red, or reddish-brown, thick, puffy, the papillæ prominent, and it is covered at its base with a creamy fur, which projects more or less irregularly in streaks towards the tip. In some cases a mere inspection shows a clean tongue, but an examination reveals the coating at the base of the organ. The mucous membrane of the pharynx, palate, and palatine arches is relaxed and puffy, the tonsils often a little enlarged, and one side usually more so than the other; and the uvula is generally relaxed to a slight degree. The follicles of the throat are not prominent, as in follicular pharyngitis, but the whole membrane looks as if underlaid by a layer of effused lymph bulging the mucous membrane forwards. The posterior portion of the uvula and palate, and the upper portion of the pharynx, as well as the naso-pharyngeal region, will be found in the same puffy condition. Usually the parts are deeper in color than is normal, but very often the color is unchanged. The entire larynx, however, is always congested, and the vocal cords are pink or red instead of being white or whitish. This redness of the cords is greatest at their arytenoidal insertions, so that the maculæ flavæ have become maculæ rubræ. The mucous membrane covering the cartilages of Santorini are quite red and puffy, and a similar condition extends more or less along the whole ary-epiglottic fold. A streak or pellet of mucus often occupies the inter-arytenoidal commissure, and mucus is often also adherent along the lateral walls of the larynx, representing accumulations coughed up from time to time, but not yet coughed out. This coughing keeps up the congestion of the larynx. The trachea often participates in the congestion. The mucus in the trachea is very adherent, and seems to require a good deal of effort to dislodge it. I have watched its progress up the trachea, from ring to ring almost, gaining a little at each cough, until finally it reaches the larynx. The hoarseness, in this complaint, is marked and constant; less evident in singing than in ordinary conversation; more marked early in the morning, and after a meal. There is a sense of fulness in the throat, a consciousness of the presence of a layer of phlegm to be hawked up or coughed up with a laryngeal cough. There is no pain, but a constant consciousness of an uncomfortable sensation, which is very annoying. Sleep is usually good, and the matters are expectorated freely in the morning, after which the expectoration is light, and sometimes almost unnoticed for the rest of the day. It usually comes up in little clumps which have become formed by the accumulations coughed from time to time into the larynx. These are usually yellowish in color. Sometimes the clumps expectorated early in the morning are brownish, and occasionally almost black.

In other cases the expectoration is more profuse, interfering with sleep; and there may be dyspepsia, giddiness, headache, and more or less manifestation of general nervous disturbance. This condition may be called a chronic catarrhal laryngitis.

The treatment that I have found most efficient under these conditions consists in an inhalation of carbolic acid or iodine, or a combination of the two, sometimes of muriate of ammonia, with counter-irritation, in obstinate cases, at the nape of the neck or over the larynx anteriorly.

The diet is to be restricted, condiments avoided, and stimulants interdicted; and to assist digestion, five drops of Fowler's solution of arsenic may be taken after every dinner or principal meal. When this does not suffice, ten or fifteen grains of pepsine are to be taken with each meal, and each meal is to be followed by a glass of water acidulated with a few drops of muriatic or nitro-muriatic acid, or the acid phosphate liquor. Where there is a good deal of dyspepsia, I sometimes order dry cupping over the stomach; and where there is a tendency to costiveness or actual constipation, generally prescribe an aperient and tonic pill, containing podophyllin, belladonna or hyoscyamus, extract of nux vomica or of ignatia amara, and quinine, with rhubarb or gentian enough to make the mass; and recommend the free use of water between meals.

The local treatment, if required, would not differ from that to be recommended for chronic laryngitis in general.

The chronic Laryngitis of Phthisis.—The fact that various affections of the larynx, some remediable and others incurable, present similar subjective symptoms of cough; purulent or sanguineo-purulent expectoration; impaired respiration; and, when protracted, diarrhœa and hectic, accounts in great part for the opinion of some authors, in contrast to the opinion of others, that there exists a special disease in which tuberculization, if not tubercle, is confined to the larynx; which disease is susceptible of cure.

Simple chronic laryngitis, catarrhal or ulcerative, is often a curable affection; but, on account of its resistance to treatment, or its persistence in spite of it, or its total neglect, proceeding gradually from bad to worse, it will produce the subjective symptoms, and for that matter all the objective symptoms also, which writers have been pleased to ascribe to laryngeal phthisis.

Should asthma coexist with chronic laryngitis, as in the case of a young lady 18 or 20 years of age, recently under my care, it will well represent the symptoms of this disease as ascribed to an early stage of phthisis laryngea; and the analogy is greater in the case alluded to, from the peculiar hoarseness so much dwelt upon in some descriptions being here caused by the pressure of a tumor the size of a large pea, situated on the mucous covering of the arytenoid cartilage and the inter-arytenoid fold, and pressing upon the vocal cord of the right side.

A deposit of tuberculous matter in the larynx and trachea does not often occur, as a general rule; indeed its tendency to deposition in these localities is denied by some authors and doubted by others. So careful an observer as Dr. S. Scott Alison, writes[1] that he has never seen tuberculous matter grouped in masses even so small as mustard-seeds; and that when deposited, it seems to affect very fine forms, scarcely visible to the naked eye, such as he has observed in the aorta and pulmonary artery; but he has never seen anything similar to the distinct masses of tubercle found imbedded in the mucous membrane of the bowel. Recently some observers, familiar with the use of the laryngoscope, report that they have detected tubercle deposited upon the mucous membrane of the larynx early in the disease; and we find some of them, as Gibb[2] and Marcet,[3] actually depicting them in their illustrations of the laryngeal image. Such instances must be rare, for of the hundreds of cases of the disease under consideration which the writer has had occasion to examine, he cannot recall a single one in which the larynx was studded by the distinct points so graphically described by the authorities cited, and by others. The most he has seen, and that very rarely indeed, was one or two, or perhaps as many as three or four isolated white spots the size of a large pin's head, which, in cases of slowly progressive pulmonary tuberculosis, retained their position and appearance upon the mucous membrane of the laryngeal walls, without change, for months and months. He has thought these might have been degenerated tubercles. He has frequently observed, however, in tuberculous cases, groups of enlarged follicles or glands over the arytenoid cartilages, the corpuscles of Santorini, and occupying the lateral walls of the larynx, which presented somewhat the appearances described and depicted by the authors in question; but he has never had reason to believe them to be tubercles, and, with due deference to the opinion of others, has held them to be prominent glands, to the external appearances of which a yellowish tinge had been given by the tension of the mucous membrane over them. A similar appearance will often be found in some simple inflammations occupying the lips, the inside of the cheeks, etc., which occur under the influence of temperature, indigestion, or overwork. A want of opportunity to examine such a condition in the larynx after death warrants a mere expression of opinion only, which further observation must modify or confirm.

---

[1] Morbid Conditions of the Throat in their Relation to Pulmonary Consumption. London, 1869, p. 8.

[2] On Diseases of the Throat and Windpipe. 2d edition. London, 1864.

[3] On Diseases of the Larynx. London, 1869.

The author discards altogether the notion of any distinct disease to be called laryngeal phthisis, whether it be the tuberculous ulceration of the laryngeal mucous membrane so often observed in general phthisis early in the disease, or whether it be the extensive ulcerative chondritis and perichondritis of the older authors. It is altogether doubtful if ever a case existed in which tuberculous disease was confined to the laryngeal structures.

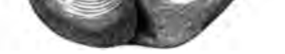
It is very rarely indeed that we meet with distinct evidences of tuberculous deposit, upon laryngoscopic inspection, in the incipient stage of phthisis. We have reason to suspect that such deposition is in progress when we see the surface of the anæmic mucous membrane, presenting here and there a small whitish prominence the size of a pin-head or a mustard-seed, irregularly oval or round in outline, and looking as if it could be popped out from beneath the membrance by the point of a bistoury. Sometimes we see groups of such elevations. They occur on the epiglottis, but more frequently on the laryngeal surface of the ary-epiglottic folds, on the ventricular bands, and on the inner surface of the corpuscles of Santorini; but they may occur in any portion of the larynx. These have been supposed to be miliary tubercles. Occasionally we see them remain without any change in appearance for months, conveying the impression that they are calcareous degenerations of former tubercles. It is likely that they are occasionally discharged and expectorated, though no instance of the kind has come under the observation of the author.

More frequently we observe an anæmic appearance of the entire mucous membrane of the larynx, the mucous membrane of the pharynx being in a similar condition. Accompanying this condition we see an irregular vascularity of portions of the mucous membrane, which here and there is elevated in irregular ridges, or clumps of a distinctly velvety appearance, red in color, and conveying the impression of denuded epithelium. There is often a general swollen condition of the mucous membrane, but it is by no means constant. The most frequent locality of swelling, perhaps, is upon the surfaces of the cartilages of Santorini, which are converted into irregularly rounded cushions, very red, sometimes fiery red; and not unfrequently actually livid at the points where they press together in phonation and in deglutition. Occasionally the epiglottis will be quite flaccid, presenting a marked contrast to its ordinary condition of stiffness. The inter-arytenoidal fold is very apt to participate in this condition, and will be usually red, often with irregular projections on its laryngeal face, which projections in some instances gradually assume the appearance of small warts or vegetations, the growth of which is sometimes accelerated, and again retarded during the course of the disease. This point, the laryngeal face of the inter-arytenoidal fold, is, when the seat of disease, almost constantly covered by a thin layer of mucus, or muco-pus, or pus, which gradually trickles over the bridge of tissue into the pharnyx, and occasionally when wiped clean with a sponge, discloses an irregular ulceration of the membrane. There is usually a thinner layer of mucus bathing the interior of the larynx to a greater or less extent, with often small clumps of thicker mucus clinging to the edges of the vocal cords, much in the same manner as a viscid material such as molasses would cling to the fingers when pressed together and separated. The vocal cords are usually more or less congested and sometimes intensely so, so that they are as deep in color as the general laryngeal mucous membrane, and, if the latter be at all anæmic, even of a deeper red. Sometimes they are studded with points of ecchymoses.

At a later stage of the affection, the velvety projections of the mucous membrane undergo abrasion, and ulcers are left, varying in shape and position. The mucous membrane upon the vocal cords finally gives way also, and we find ulcers upon these structures. Sometimes the membrane gives way at the very edges of the cords, and leaves them with an irregularly jagged or toothed border, looking not unlike a shred of scolloped muslin, from which some of the transverse threads have been drawn out. These projections present favorable points for the accumulation of the viscid secretions of the larynx; so that there arises frequent occasion to clear the glottis from the clumps of mucus which adhere to its lips, and produce irritation and irrepressible cough. The lateral walls of the larynx now show increased swelling, and the ventricular bands project, sometimes on both sides, but more frequently on one side only, into the interior, so as to cover the vocal cords more or less completely, and their borders approximate in closure of the glottis before those of the vocal cords themselves; and they not unfrequently exhibit a dull grayish aspect, and are sometimes covered with an ash-colored membranous deposit. Not infrequently the line of demarcation between ary-epiglottic fold and ventricular band is entirely obliterated. The general signs of inflammation in the larynx increase; we find the epiglottis invaded, its edges becoming inflamed or ulcerated, as also its laryngeal face; the outer surface of the larynx becomes implicated; the purulent or muco-purulent secretion accumulates in the pyramidal sinuses which are sometimes filled with it, and in the glotto-epiglottic sinuses; and the swollen structures become more and more irregular and deformed in outline, so that it is extremely difficult to describe or depict the altered appearance of the parts. Sometimes we find the ventricular band adherent to the vocal cord below it, obliterating the ventricle; with this condition, and also sometimes independently of it, we see one vocal cord raised higher than its fellow, preventing their proper approximation, and producing persistent dysphonia. This condition will sometimes be perceived at a very early stage of the disease, when the only subjective symptom will be the hoarseness. Eventually, however, unless retarded by general hygienic treatment or local astringents, other symptoms gradually appear, finally leaving no doubt as to the tuberculous nature of the affection. Irregular granulations are disposed to spring up about the bases of the tuberculous ulcerations, or around their edges, forming veritable neoplasms, usually containing epithelial elements under the microscope, and showing a marked disposition to repullulation from their base as fast as they may be torn off by forceps, or destroyed by caustics, procedures which become often necessary for the relief of dyspnœa, and of tickling sensations exciting irrepressible cough. These are found perhaps most frequently upon the inter-arytenoid fold, but also on the inner surfaces of the arytenoid cartilages, on the posterior edges, and inferior face of the vocal cords, sometimes at the anterior angle of the vocal cords, at the base of the epiglottis, sometimes near the edge of the epiglottis on its laryngeal face, and upon the surface of the ventricular bands. Again and again I have seen them sprout, fungus-like, from the bed of the ulcer, and increase in size from week to week. Sometimes these vegetations appear without any evidence of ulcerative action present or past, and when pulled off become the starting-point of ulcerative action which might not otherwise have been excited until a subsequent period of the disease. Some caution is therefore necessary in interfering surgically with these vegetations when present in a case of phthisis; and it is only when they are of a size to present considerable interference with the functions of the parts, that they are to be attacked; for sometimes, under a judicious management of the general condition, and the inhalation of gently stimulating, astringent, or absorbent remedies, they slowly disappear without the aid of cautery or forceps.

Ulcerative action, when once set up in the laryngitis of phthisis, is exceedingly difficult of control. It is apt to surmount the laryngeal wall, posteriorly or laterally; and it then presents an impediment to deglutition, and a provocation to vomiting; conditions of affairs which grow steadily from bad to worse, until finally it becomes impossible to nourish the patient by the stomach, or even to quench his thirst with a glass of water. Almost every particle attempted to be swallowed is regurgitated with violence, sometimes into the larynx, sometimes into the nostrils, sometimes both ways at once, producing intense spasmodic paroxysms of cough, dyspnœa, and local distress, so that the suffering of hunger and thirst will be endured as long as possible, before the afflicted patient resorts to a temporary alleviation, which is to be purchased only at the expense of a repetition of the dreaded paroxysms. The approach of inevitable death, often long postponed, is awaited with bitter satisfaction, in the knowledge that an end to the suffering must come, and, if consciousness remains to the last, it is with a sigh of relief that the patient expires. While the patient is in this condition, but little can be seen of the interior of the larynx; and the enlarged area of the arytenoid and Santorini structures, the cartilages of which are probably undergoing caries, the swollen folds forming the lateral walls, and other œdematous structures are so covered with mucus and pus, that no definite idea can be obtained of their condition, other than of the general nature of the impediment which they present to respiration and deglutition. Fig. 63, from one of the author's cases, represents a common appearance of this condition.

Fig. 63.



Laryngoscopic appearance of Œdema of Larynx with ulceration, in the latter stage of phthisis.

Necrosis and discharge of the laryngeal cartilages is also apt to follow if the patient survives long enough for the necessary changes to take place.

Phthisis, attended with the laryngeal complications just enumerated, is apt to be chronic in its character, continuing for a number of years, varying say from two or three, to seven or eight; and is always attended finally with extensive ulceration of the trachea, in parts often beyond the reach of laryngoscopic exploration, ulceration sometimes productive of perforation into the œsophagus.

In the earliest stages of the disease, the affection is usually confined to one side, and that, the side on which the disorganization is taking place in the lungs. Subsequently the other side is attacked likewise.

A brief transcript, from some of the notes in my case-books, will illustrate the character of the laryngeal ravages met with in this form of phthisis.

1. *Oct.* 21, 1866. A stout farmer, about forty years of age, and weighing 190 lbs. Laryngitis of three years' duration. Condensation in upper lobe of right lung. Ulcerations on right vocal cord, right ventricular band, and right glotto-epiglottic fold and sinus. Ultimately died of phthisis pulmonalis.

2. *Nov.* 14, 1866. A female detective, æt. 44. Married. Placed under my care by Prof. H. H. Smith. Softening and vomicæ on left side. A large ulcer on the inner surface of the left arytenoid cartilage, and covered with a cheesy-looking deposit; posterior portion of vocal cord of same side ragged, as though eaten out by ulceration. *Dec.* 27th, cheesy deposit now on right arytenoidal wall. *Jan.* 16th, 1867, both arytenoid cartilages œdematous, and swollen to at least four times their normal dimensions; these œdematous swellings, both ventricular bands, and both vocal cords, covered with an ash-colored membranous deposit. Death, *Jan. 24th.* No autopsy.

3. * * Cynthia W. * * * Epiglottis bent over to left side; ulceration over entire quadrangular membrane of that side; ulceration of left ventricular band; partial loss of left vocal cord by ulceration. Pulmonary ravages also on left side. Termination unknown, but supposed to have been fatal.

4. A. R., fireman, æt 28. Epiglottis bent to right side; ulceration of left side of larynx, with purulent discharge from left ventricle; ulcers on left vocal cord; pus in left pyriform sinus; vomicæ in left lung; softening in right lung. Death within a few months.

5. * * * Œdematous epiglottis, and ulceration of glosso-epiglottic sinuses.

6. *Oct.* 25, 1867. Mary L., æt 17, in advanced stage of phthisis; tubercles disseminated throughout both lungs. This patient had been brought many miles for examination on account of complete aphonia, moderate dyspnœa, and some dysphagia. The epiglottis was swollen to a size larger than a man's thumb; it was fan-shaped, and could be seen projecting behind the tongue, on mere inspection without using the laryngoscope. Both aryteno-epiglottic folds were œdematous. This patient was very wilful, and would not permit an attempt at scarification of the parts, which would have afforded her great relief. Some finely pulverized tannin was propelled upon the parts, which produced marked diminution of her distress at once, with partial restoration of voice. The patient returned home next day, and died shortly afterwards, without having had any evidence of increase in the local symptoms.

7. * * * * 1867. Œdema of palate and epiglottis.

8. * * * * 1867. Mr. E., of Harrisburg, was examined by me at request of Prof. Gross. There was aphonia and dysphagia of two months' duration, attributed to a cold. The only thing the patient could swallow, without distress, was iced-water. There was great œdema of the epiglottis, cutting off the view of everything else except the posterior portions of the vocal cords, which were gray, and bathed in pus, as were also the swollen corpuscles of Santorini. The pharynx was inflamed, but presented no abrasions. In order to obtain a view of the parts, it was found necessary to place the eye at a lower level than the patient's mouth, and to look upwards upon the mirror. There was abundant evidence of tuberculous deposit in the lungs; and the patient succumbed a few months afterwards.

9. *Nov.* 14, 1867. Mrs W., sent by Dr. Patski. Epiglottis

ulcerated on the laryngeal face, and adherent to the tongue in its lingual surface; uvula swollen and bifid; throat difficulty of six months' duration, attended, for three weeks, with great dysphagia in swallowing solids as well as fluids. Termination unknown.

10. * * * * æt. 26. Examined for Dr. Tyson. Œdema of epiglottis and of both arytenoids, preventing view into interior of larynx. Parts anæmic. Complete aphonia. Pus running over inter-arytenoid fissure into pharynx. Termination unknown, but believed to have been fatal.

It is a matter of indifference whether "tuberculous laryngitis," as it is called, is a disease of itself, or dependent upon a tuberculous condition of the lungs. The essential malady is one and the same thing; and sooner or later, either before the appearance of the laryngeal ulcerations, or during their progress, the pulmonary symptoms become manifest. Many cases of pulmonary tuberculosis proceed to their fatal issue without any involvement of the larynx; but in most of them, if their stages are completed, the larynx becomes involved towards the close, if not sooner. When the larynx is involved, the disease becomes a very serious one indeed, rarely, if ever, curable, and sometimes insusceptible of amelioration or relief. At times the laryngeal symptoms recede for a while, local remedies seeming to repress the local manifestations; and when this is the case, it is usually evident, at the same time, that the pulmonary complications are progressing anew. Sometimes the pulmonary difficulty diminishes while the throat trouble increases; at other times they advance together in spite of the best-directed efforts. Occasionally the throat becomes healed without any advance in the disease of the lungs; and in rare instances the disease seems to be arrested in both localities. I have records of a few instances, still under occasional observation, in which the improvement has been steadily maintained for three and four years; two or three of them for a longer time; and in whom there has not been, in all this period, any manifestation of an advance in the affection. Statistics, however valuable they may be for tabulation, are of little use in forming a prognosis with reference to any individual case of this kind. Under my own hands, two very unpromising cases, and one particularly so, in which I could not refrain from a decidedly unfavorable prognosis, improved steadily, much to my surprise and almost against hope, under the use of cod-liver oil internally, inhalations of carbolic acid, and local applications of nitrate of silver. On the other hand, and what is more to the point, I have often signally failed in restraining the onward progress of destruction in cases apparently favorable for improvement, and where there was every reason to hope for it, from family history, physical condition, integrity of digestive powers, and ability and willingness to second in every way the efforts of the physician.

Local treatment to the larynx, such as is described under the head of treatment of chronic laryngitis, is often of benefit to the patient in the laryngitis of phthisis, though inadequate to a cure of the disease. There often coexists in these cases a similar condition of the entire trachea, which cannot be reached except in general medication of the upper air-passages by injection, insufflation, or inhalation.

In some conditions of laryngitis associated with phthisis, there is a predisposition to the involvement of the cartilage, in the form of a chondritis or perichondritis, set up either as a primary affection, or, as appears to be the case in some instances, resulting from extension of the disease already existing in the soft structures. This is the laryngeal phthisis of the older writers, to which allusion has already been made. These cases are particularized by the great extent to which the cartilages are involved, denuded, and discharged. All the cartilages are subject to this perichondritis, the arytenoid cartilages, perhaps, especially. As these cartilages are the levers which move the vocal cords to and fro, we can understand how their free outward and inward motion is impeded by swelling, thus producing more or less impairment of voice; and we can recognize the cause of the complete aphonia which usually ensues on their destruction. Aphonia is not always a necessary result of the loss of the arytenoid cartilages, for inflammatory adhesions may have taken place during the discharge of the cartilage, pinning the vocal cords, as it were, to the mucous membrane, which then, with an intervening deposit of organized products of infiltration, answers the purpose of an imperfect cartilage. This affection is recognized in the laryngoscopic mirror, at the posterior portion of the laryngeal entrance, by the œdematous swelling of the parts, about which some point of ulceration can usually be detected.

The cricoid cartilage suffers sometimes primarily and sometimes apparently as an extension from the disease affecting the arytenoids. The condition is recognized by a swollen or ulcerated appearance of the part, as the case may be, within the larynx and beneath the vocal cords, or bulging up between them.

The thyroid cartilage is sometimes affected, usually at its anterior portion, just below the position of the vocal cords. Sometimes the disease extends to the anterior perichondrium, and thence into the subcutaneous tissue, giving rise to a fistule. Prof. Rokitansky has recorded a case of emphysema originating in this manner.

The epiglottis, when the seat of perichondritis, is converted into a thick, ungainly pad, usually bent upon itself, larger on one side than the other, and almost always preventing a satisfactory view into the larynx; though usually some portion of the glottis can be seen, enough to enable us to judge of its condition of integrity or deficiency. Sometimes the epiglottis is attacked separately; but more frequently in connection with more or less disease of a similar character affecting the arytenoid cartilages, or at least the cartilages of Santorini. In connection with the inflammatory condition of these affections, there is more or less œdema of the parts, attended with all the symptoms and risks of that condition. The diagnosis of perichondritis is usually confirmed by the pain and tenderness produced by external pressure upon various portions of the larynx, and by moving it gently from side to side.

The disease progresses, if the patient lives long enough, until the diseased or dead cartilage is expelled; and then the patient runs the risk of suffocation during its expulsion. Sometimes, however, the necrosed cartilage has been recognized in the mirror, and under these circumstances the progress towards its detachment can be watched, and be occasionally assisted by the forceps. Should symptoms of dyspnœa be seen to be due to impaction of cartilage, unfavorably disposed for extraction by forceps, tracheotomy is demanded to insure the safety of the patient.

When the cartilage has been discharged, the local and general symptoms of the patient improve at once, especially if there be no necrosis going on elsewhere; so that he seems to have gained a fresh lease of life.

Usually, however, the disease is inevitably and progressively fatal; and after death, evidences are found of extensive participation in the disease on the part of the rings of the trachea, portions of which are not unfrequently detached and expectorated during the life of the patient.

Gangrene of the larynx sometimes occurs. Porter,[1] mentions a case in a male, æt. 65, who died in Meath hospital with gangrene of the lung, and who had exhibited marked and increasing evidence of distress in the larynx for seven days previous to his death. On examining the larynx, a gangrenous ulcer was found involving the left vocal cord, in superficial surface about the size of a shilling, and of a dirty green color; its edges quite sloughy, and its centre excavated to a considerable depth; the mucous membrane around highly vascular, and covered with a pellicle of lymph.

The Chronic Laryngitis of Syphilis.—This affection, as already stated, cannot with certainty be distinguished from other forms of chronic laryngitis, by ocular inspection only. This is especially so in those cases where syphilitic and tuberculous laryngitis coexist. The history of the case, and the evidence of analogous disease elsewhere, will aid the diagnosis, and if this be correct, the treatment will prove it, if the case has not progressed beyond the susceptibility to cure. The general appearances having been already discussed, some special points only require mention here. In the extensive ulcerations that accompany tertiary syphilis, and which may attack any portion of the larynx, we sometimes notice deep excavations, with undermined edges, more or less rounded in their visible outline, and covered with a grayish or grayish-yellow deposit; peculiarities which are regarded as characteristic. The existence, too, of cicatrizations, marking the locality of former ulcers, is almost presumptive evidence of syphilis, inasmuch as ulcerations of the larynx rarely heal during the active progress of tuberculosis or carcinoma. It is usually associated, in its later manifestations, with syphilitic inflammation of the hard and soft tissues of the mouth, palate, and pharynx, and sometimes with actual necrosis and discharge of the anterior portions of the cervical vertebræ. The ulceration extends deeply and widely; in the one instance producing destruction of the cartilages, and in the other, ulcerations of such large surface, that in their cicatrization the dimensions of the laryngeal cavity are considerably encroached upon, to such an extent, in some instances, as to demand the operation of tracheotomy. With the exception of the epiglottis, the cartilages of the larynx are eaten out of their investments, as it were; that is to say, an ulceration extends into the cartilage, and, if small, surrounds it, or, if it be a large cartilage, circumscribes a portion of it; this portion, within the zone of the local process, perishes, is laid bare, and becomes detached from its connections, remaining, in some instances, entangled in a sort of pocket scooped out of the soft tissues. The necrosed cartilage finally breaks through to the interior, and, if it be situated below the glottis, may induce paroxysms of suffocation, or actual asphyxia from its presence as a foreign body. The arytenoid cartilages and the cricoid are those which are most apt to produce this complication, though occasionally it is effected by exfoliation of part of the thyroid. Sometimes the inflammation begins in the external perichondrium of the cartilage, and the resulting abscess bursts externally, so that the necrosed cartilage is removed in this way. The epiglottis, though sometimes attacked on its laryngeal face in this same manner, seems more disposed to undergo progressive destruction from the side; the diseased process being directed that way, perhaps, in consequence of the direct lateral connections of the epiglottis with the pharynx. Sometimes the entire epiglottis is destroyed, leaving a mere stump to represent the organ. This, however, does not prevent deglutition, and sometimes does not even interfere with it.

---

[1] On the Larynx and Trachea, p. 122.

The result of the chondritis or perichondritis, which is set up primarily by the syphilitic poison, or which follows syphilitic ulceration of the mucous membrane, produces more or less submucous infiltration in the adjacent submucous tissue, presenting a condition which may be regarded as chronic œdema. This, if extensive, produces all the symptoms narrated under the caption of œdematous laryngitis, and may necessitate tracheotomy. Sometimes blood-vessels are opened by the ulcerative process, and hemorrhage is produced, which is sometimes fatal. The trachea participates in the ulcerative action; portions of its cartilages are necrosed and expectorated, and extensive ulcers are formed, the cicatrization of which produces constriction or stenosis of the windpipe, which, when low down, is often beyond remedy, even by the performance of tracheotomy; the parts being illy suited for improvement from artificial dilatation.

Sometimes the matters in the submucous infiltration become organized and transformed into a fibrous tissue incapable of undergoing absorption, and thus producing permanent deformity and constriction of the larynx.

There are often several ulcers occupying different portions of the larynx, and not at all confined to one side; indeed they are perhaps more inclined to be symmetrically arranged than are the ulcerations of tuberculosis.

The tendency of syphilitic laryngitis to excite inflammation, leading to the deposition of fibrine, which becomes organized, and contracts permanent adhesions to the walls of the larynx, and by its subsequent contraction tending to bring these walls into closer contact, is very great, and we often meet with contraction of the calibre of the tube from this cause—*stenosis*, as it is technically called—which, even when attended to early, does not often yield to systematic artificial dilatation, but usually necessitates a resort to tracheotomy, for the purpose of securing respiration through a metallic canule inserted into the windpipe below the seat of obstruction.

When the adhesions take place between the vocal cords, the symptoms are very serious, there being dyspnœa and more or less complete dysphonia, or even aphonia, if the condition be at all extensive. Operative procedures have been instituted for the relief of this condition, similar to those employed where a bridge of tissue stretches from one cord to the other as a new growth, or as a result of the inflammatory action following removal of a neoplasm from this situation, as detailed under the head of growths in the larynx.

An interesting case of this kind, in which external section of the thyroid cartilage was performed in order to divide the web, is reported by Dr. Morell Mackenzie,[1] and, as it is unique, we copy the record for our readers.

"J. D., aged 33, formerly a farrier in the Life Guards, was admitted into the Hospital for Diseases of the Throat, May 11, 1871, wearing a canula. Eighteen months previously he had been admitted, on account of extreme dyspnœa and complete aphonia, which had existed for nearly two years, and was due to tertiary syphilitic disease of the larynx. Tracheotomy had been performed at the time, and the patient left after a few weeks, wearing the tube.

"On his readmission, an examination with the laryngoscope showed a web extending from one vocal cord to the other, and occupying the anterior five-sixths of the glottis. He was, of course, able to breathe well through the canula, but there was absolute loss of voice. Under these circumstances, it was determined to make an incision in the mediate line, through the thyroid cartilage, and to divide the web; and in order that it should not again unite, it was proposed that the patient should wear a double-branched canula, one branch consisting of the ordinary tracheal tube passing downwards, and a second similar tube passing upwards, between the vocal cords, and being attached externally to the first tube. This was accordingly done on May 16. The patient did very well for the first three days, but on the evening of the third day it was seen with the laryngoscope that the upper portion of the tube was producing an ulcer on the right arytenoid cartilage, and great pain was experienced in swallowing.

"On the following morning, May 20, both tubes were removed, as it was deemed important to allow as full a current of air as possible to pass through the trachea. It must, however, be understood that the upper laryngeal canula was obliged to be removed, because of the irritation it produced, before all chances of reunion were over.

---

[1] *Medical Times and Gazette*, August 19, 1871, page 218.

"He appeared perfectly well for the first few days, but on May 25, one or two severe attacks of dyspnœa having occurred, the tracheal canula was replaced.

"June 1.—On laryngoscopic examination, it was found that the greater portion of the web had been destroyed, and that more than three-fourths of the area of the glottis was free.

"The man is now acting as under-porter at the Hospital, and it is proposed shortly to remove the tube. At present he is wearing a canula with a pea-valve, and an oval opening on the upper surface of the tube."

In this case Dr. Mackenzie remarked, "that he had pursued the plan of treatment which he had found successful in two previous instances, but in this case the result was as yet only partially successful. Owing to the adhesion of the vocal cords, the man had been completely aphonic, but he was now able to speak well. At the time that it was originally intended to dispense with the tracheal tube, there was a good deal of inflammatory swelling consequent on the recent operation, and hence the patient was unable to breathe without an artificial opening. All thickening having now subsided, there is every reason to believe that the patient will soon be able to breathe perfectly well through the natural passages."

As a result of chronic laryngitis, we meet not unfrequently with adhesions of various parts, which sometimes interfere seriously with the due performance of the functions of deglutition, phonation, and sometimes even of respiration. Without going into the detail of the various examples of this kind which may present themselves, we may mention depression of the epiglottis to one side or the other, preventing proper closure or complete erection of the valve; adhesions of the ventricular band to the vocal cord below, preventing proper vibration of the cord, and thus producing often a shrill, weak, piping voice, and sometimes preventing closure of the glottis; adhesions anteriorly of the two vocal cords, or of the two ventricular bands, etc. Besides these deformities, we have others the result of cicatrization, some of which are alluded to elsewhere.

The treatment of these conditions consists in relieving the constriction as far as possible by laryngoscopic division of the adhesions, and then cauterizing and re-cauterizing the adjacent surfaces to prevent fresh adhesions. These cases require careful watching and prompt attention to prevent recurrence, which is very apt to take place. When the epiglottis is implicated, much good can be done by teaching the patient to move the organ frequently during the day by means of his forefinger.

The Treatment of Chronic Laryngitis.—In the treatment of chronic laryngitis, the condition of system, and the local manifestations of the affection, demand equal consideration. Cases unattended with ulceration of the mucous membrane sometimes yield readily to simple local treatment, by mineral astringents, with due attention to diet, clothing, exposure, and maintenance of the functions of the skin and other emunctories. The local remedies may be inhaled in the form of spray in weak solution, or, what is better, may be applied in strong solution directly to the parts by the laryngeal douche, or by the brush or sponge. For these solutions the best menstruum is water, though some physicians prefer glycerine for the local applications by the mop. For inhalation we may use sulphate of zinc or copper, two grains and upwards to the ounce; the acetate of lead in similar proportion; the sulphate or sesquichlorate of iron in very weak solution; carbolic acid a grain or two to the ounce; the nitrate of silver, a half a grain and upwards to the ounce; or the nitrate of aluminium, one to five grains to the ounce. These and similar remedies are applicable when the secretion is in excess. Where the parts are dry, we may employ solutions of muriate of ammonia, five grains and upwards to the ounce; iodide of potassium in similar proportion, or the compound solution of iodine and iodide of potassium, two or three drops and upwards to the ounce; chlorate of soda, or chlorate of potassa, five grains and upwards to the ounce; or, what I have often found excellent in inducing secretions of the mucous membranes of the throat, the tincture of pyrethrum, or the Spanish pellitory root, from ten grains and upwards to the ounce. To these inhalations, a drop or two of good cologne-water added to each ounce of the solution, will render their contact with the parts much more grateful. If there is a good deal of pain in the parts, small quantities of the watery extracts of opium, hyoscyamus, belladonna, stramonium, and the like may be added. Paregoric is often an excellent article for this purpose.

To be effective, these inhalations should be taken by the patient in his own apartment, about three times a day; although in the cases of individuals compelled to go out to business we may prescribe a morning and evening inhalation only, and on this account may increase the proportion of the remedial agent accordingly. The only precautions necessary are, to avoid irritation of the bronchial tubes by too deep inspirations, when strong astringents are used; to take care that the sprays gain access into the larynx; to protect the face and teeth from nitrate of silver, preparations of iron, etc., by passing the spray through a funnel-shaped glass or other tube passed into the mouth; and to avoid exposure to the air for at least twenty minutes after having taken a warm inhalation.

For further details on this subject the reader is referred to the author's volume on Inhalation,[1] and similar works of the kind.

When local treatment of this kind is inefficient, we are compelled to resort to topical medication of the larynx with more potent remedies; and in cases of long standing, or of much severity, it is best to adopt this plan at the commencement of the treatment. At the same time appropriate inhalations may be kept up by the patient himself. These inhalations serve a better purpose than the gargles which were formerly employed for self-treatment.

Of all the local remedies employed in the treatment of chronic laryngitis, nitrate of silver and sulphate of zinc will be found the most frequently beneficial; but where the laryngitis is attendant upon tuberculosis, tannin will often prove more serviceable; and in laryngitis of syphilitic origin, the acid nitrate of mercury. Iodine, carbolic acid, nitrate of aluminium, chloride of gold, chloride of zinc, iodide of zinc, the various acids, and, in fact, the entire list of similar destructive chemicals prepared in the laboratory have been extolled for the topical treatment of chronic laryngitis, and, appropriately selected, and carefully applied, are no doubt beneficial. In some individual cases we are compelled to resort to an unusual remedy, in the hope of producing an effect which we cannot obtain by the means ordinarily employed. The materials employed by the author, for topical applications to the larynx, in chronic laryngitis, are, almost exclusively, with the exception of special cases referred to in the preceding paragraph, nitrate of silver and sulphate of zinc in ordinary cases, tannin in cases associated with phthisis, and the acid nitrate of mercury in syphilitic cases. The laryngitis attending malignant disease is, perhaps, best let alone, as far as severe topical applications are concerned, unless it becomes necessary to interfere for the restraint of hemorrhage; and even in these cases the bleeding may often be controlled by inhalations of iron, or of the other astringents employed in the home treatment by inhalation.

---

[1] **Inhalation; its Therapeutics and Practice. Philadelphia, 1867.**

The author has acquired the habit of applying nitrate of silver principally by the sponge, and sulphate of zinc almost exclusively by the douche. The solution of nitrate of silver varies from forty or sixty grains to the ounce, to one hundred and twenty grains, and in some cases a saturated solution is employed, usually formed, at the moment of use, by rubbing a small bit of moistened sponge, for some seconds, upon a large crystal of the nitrate. The tolerance of the parts is tested by a weak solution in the first instance, and this is diminished in strength at the next application, or increased, according to the behavior of the case. He deems it undoubtedly better when the application can be borne—and it can be borne almost always—to make a decided impression by a severe application, and wait three or four days for its effects to subside before renewing it, rather than to torment the inflamed structures by the daily application of mild, and too often, on that account, inefficient solutions. In some cases, the solid or fused nitrate of silver is employed, but this is rarely called for except to touch an isolated spot, and to prevent the nitrate from spreading around the tissues and over them, as it would do applied in solution by the brush, sponge, or cotton wad.

The sulphate of zinc is used in the proportion of from thirty to sixty grains to the ounce. I employ it principally in cases where there is general congestion of the entire larynx, and more or less, usually, of the trachea also. Here, the use of the syringe, or the douche, enables us to wash the parts at once with a stream or a spray of the solution.

In obstinate cases of chronic laryngitis, persistent counter-irritation externally, with the internal use of iodide of potassium, arseniate of potassa, muriate of ammonia, the bichloride of mercury, or such other systemic remedies as may suggest themselves from the peculiarities of the case, will often be of the greatest service, provided the strength of the patient can be maintained by efficient nourishment; otherwise they will too often be found absolutely injurious. Then tonics, such as quinine, the chloride of iron, should be employed to build up or improve the system. The skin should be frequently bathed, excesses at the table prohibited, exposures to atmospheric changes avoided, and the voice used as little as may be. Where the patient is exposed to the inhalation of irritant gases or vapors, or solid particles floating in the air, he should wear a respirator at the time, or cover the nostrils and mouth with a veil; or keep the mouth closed and protect the nostrils by a tiny wad of cotton wool, delicate enough not to interfere with respiration. In severe cases, attended with frequent cough, the respirator or its substitute should be in constant requisition to modify the effect of the oxygen in the air, which is sometimes too irritating for the over-sensitive mucous membrane. The value of the respirator in these cases cannot be appreciated by those who have not witnessed its beneficial effects for themselves. Should these measures fail after a fair trial, we must be content to adhere to a hygienic regimen, and to resort to palliative measures as occasion may demand them. Where the patients are suitably circumstanced pecuniarily, a change of climate, permanent or temporary, as results may determine, is desirable. Heroic measures will not be likely to do good, and may transform an endurable condition of simple chronic inflammation into an ulcerative one, still more difficult of management.

A more active local treatment is demanded in cases of ulcerative laryngitis, especially when connected with severe inflammation of the submucous tissues, and attended with tumefaction of the epiglottis, or the upper boundaries of the larynx, sometimes amounting to œdema. These occur chiefly in phthisis, sometimes in syphilis, occasionally in simple chronic laryngitis. Here local treatment is required not so much, altogether, as a curative agent, but as the best means of affording relief to the dysphagia which this condition entails, and which, if not allayed, will gradually produce death by starvation. The best material for this local medication is a solution of nitrate of silver, sixty grains or thereabouts, to the ounce, carefully applied, every other day, every day, or even twice a day, as the case may require. Sometimes applications of this kind, by coating the parts with a protective covering, are the only means of affording the patient opportunities to swallow his nourishment.

As soon as the condition shows unmistakable signs of diminution, these applications may be suspended at once. Should the condition increase, or should it, at the onset, be of such a character as to threaten serious symptoms, scarification should be freely employed, as described in connection with the subject of œdema of the larynx; after which the nitrate of silver may be employed, should it seem called for. When the condition is under subjection, and even previously, glycerine swallowed if possible, or applied by the brush, or allowed to trickle along the back of the throat, will often be of service; sometimes, indeed, seeming to absorb the moisture from the œdematous swelling, and thus to aid in its reduction.

The difficulty is that too often, this condition is associated with disease of the cartilage, and recurs again and again.

Occasionally the chronic laryngitis is confined to a single structure, as the epiglottis. Under these circumstances, the complaint is often rapidly cured by local treatment alone, as exemplified in the following record of a case of epiglottitis:

A lady, æt. 32, applied February 9, 1867, to be treated for a sore throat, attended with painful dysphagia as the most promi nent symptom, a condition which had existed nearly five months. The difficulty of swallowing had been so great at times, that she had been forced to assist deglutition with her hands. There was a condition of chronic follicular pharyngitis, but the most marked appearance of disease was a thickened and inflamed epiglottis, relaxed and bent backwards towards the right side. This point was quite painful to the touch. The parts were thoroughly washed with a solution of nitrate of silver, sixty grains to the ounce, after which swallowing was accomplished much more easily and without pain. Two or three subsequent applications, at intervals of two or three days, relieved these symptoms entirely.

The treatment of chronic laryngitis, of tuberculous origin, would vary in some respects from that already described. In the first place, constitutional treatment is of paramount importance. The hygienic surroundings of the patient as to temperature, clothing, diet, occupation, etc., should be the very best that love or money could secure. The integrity of the digestive organs should be maintained, to the exclusion of all other treatment, if necessary. The most nutritious food that can be digested should be eaten, including the taking of cod-liver oil. It will be found that oftentimes cod-liver oil is best borne about three hours or so after a meal, or just about the close of stomachic digestion. If necessary it may be alcoholized, etherized, or otherwise made palatable. Sometimes it will be found to be taken better by warming the tablespoon. A tablespoonful morning and evening is usually sufficient. If it disagree with the patient, or cause nausea or loss of appetite, it must be abandoned. Under these circumstances the pancreatic emulsion may be employed. I have used it a great deal, and find our domestic preparations greatly inferior to that of Messrs. Savory & Moore, of London. I have also administered, with great advantage in these cases, as an additional article of diet, the extract of malt, prepared by Linck, of Stuttgart. I have tried several domestic preparations of malt extract, as well as others from other sources, and find none of them equal to that of Linck. It is in a thick paste, somewhat like guava jelly, and can be eaten from the spoon, or be spread on bread, or be dissolved in water or milk. A table-spoonful stirred into half a pint of milk makes a chocolate-colored mixture that is readily taken. One or two ounces of this extract of malt may be taken daily, or twice a day. It is not a beer; but a pure extract of the malt which has not been allowed to undergo fermentation.

Quinine is often administered as a tonic, and the usual practice of the profession is to associate iron with it, though I generally depend upon the quinine alone, and try to get iron in with the food.

The constitutional treatment would therefore be exactly that for tuberculosis of the lungs.

Local treatment is also requisite in this form of laryngitis. It is not always curative by any means; but it is almost always indispensable as a means of relief.

Nitrate of silver does good service in this form of laryngitis; but in some instances tannin seems more useful. I employ a saturated solution of tannin in glycerine, two drachms to the ounce, and apply it by the sponge, cotton wad, or the pencil, as may seem most desirable. Sometimes the powder of tannin is propelled over the parts, sometimes it is applied by the sponge. Solutions of it in water, too, are often used.

As an inhalation, I often prescribe the spray of tepid water, containing a drop or two of Eau de Cologne to the ounce. This is grateful to the parts, and assists the dislodgment of the products of secretion. Where the secretion is abundant and tenacious, excellent results often follow the inhalation of solutions of the carbonates of soda or potassa; where it is excessive or unpleasant in odor, much benefit follows the use of carbolic acid, a grain or two to the ounce, to which may often be added a few drops of the compound solution of iodine. In a few instances I have seen this combination work wonders, and apparently arrest the onward march of confirmed phthisis with ulcerative laryngitis, and permit the resumption of the patient's ordinary employments, where no such effect had been expected. In other respects the local treatment would be that for chronic laryngitis in general.

Fresh air and an equable temperature is to be maintained.

The patient should be encouraged to go out every day for two or three hours at least, and when at home should occupy a room kept at a temperature of at least 70° F., as ascertained by the thermometer, care being taken to keep the air from becoming too dry, and to maintain ventilation by means of an open window, without exposing the patient to its direct draught.

Too often, alas, we are unable to restrain the march of the disease to its fatal termination, when all that we can do is to be guided in our actions by the progressive needs of the case, and to soothe the path to the grave by every means in our power.

Tracheotomy has been recommended in cases of the kind under discussion, for the purpose of securing rest to the inflamed larynx; and the operation has sometimes been performed with such a result. It cannot be curative however, directly or indirectly, and therefore should be resorted to only in cases where, from œdema or the impaction of necrosed cartilage, asphyxia was threatened.

The treatment of syphilitic laryngitis, in its primary catarrhal or secondary ulcerative manifestations, would not differ from that of ordinary laryngitis, except that in secondary ulcerations, if there were no signs of retrogression, the patient would be mercurialized. In the tertiary forms of syphilis, however, before the disease has progressed to irreparable destruction, it can almost always be promptly arrested by the internal use of the iodide of potassium and the bichloride of mercury, and the local application of acid nitrate of mercury to the diseased structures. The caustic may be of the strength of one part in from four to ten of water, and may be applied every second or third day. Strong nitrate of silver, and the acids, are also efficient; but not more so than the acid nitrate of mercury, and often much less so. When syphilitic laryngitis has existed for a long time, such destruction has taken place and such poisoning of the system as to render a cure impossible. The constrictions of the parts produced by the cicatrices of extensive ulcers, and the adhesions between adjoining surfaces, is often such as to render tracheotomy necessary, with the permanent use of the tube; for the constrictions following syphilis are, as a rule, inamenable to dilatation.

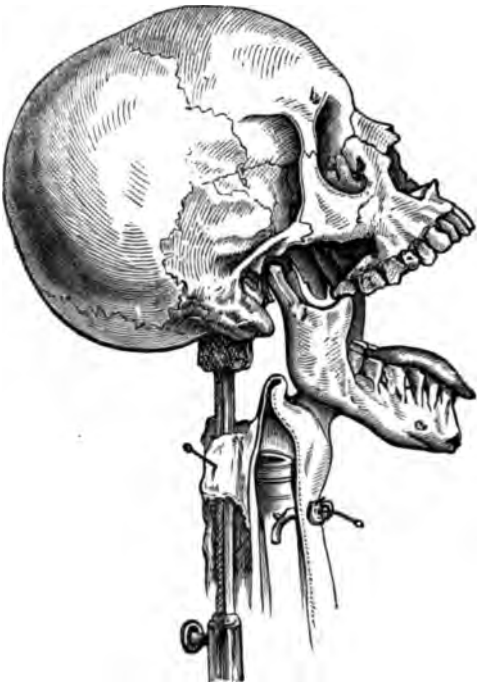
MANIPULATIONS WITHIN THE LARYNX.

It is hardly necessary to say that the topical treatment of all intra-laryngeal affections should be carried on under the guidance of the laryngoscope. It will be well, therefore, to describe the method of making these applications, and the instruments suitable for the purpose; with which view the author reproduces in part some remarks appearing originally elsewhere.[1] Certain general manipulations are necessary for the proper introduction of every instrument within the larynx, from a blunt probe to an exposed bistoury. Practice is necessary to learn to follow the reflex of the instrument in the laryngeal mirror. The plan which the writer has found most useful in instructing his pupils, is to have them begin by holding the laryngeal mirror over a plane surface, as for instance, the page before us, the paper representing the plane of the upper surface of the larynx, and the mirror being held an inch or more above it, at an inclination of about 50°. For this purpose a laryngeal picture, such as the drawing on page 19, fig. 9, may be advantageously employed. The student is directed to take a probe in his other hand, and, keeping his vision upon the image in the mirror of the spot he designs touching, to carry the probe towards the mirror until it is nearly in contact, and to move the probe gently until a distinct view is obtained of the image of its point; when, without losing sight of the image of the end of the probe, it is to be directed towards the selected spot, and to be slowly carried to it. A little practice soon renders one familiar with the degree of inclination necessary to be given to the probe to secure the desired movement. After this procedure has been repeated often enough to familiarize the student with the proper method of following the reflex of his manipulations, so as to carry his instrument at will to the right or the left, the front or the rear, the straight probe is exchanged for a curved one, such as would be suitable for introduction into the larynx, and then the same exercises are repeated; a second person, after a while, designating the points which the student is to endeavor to touch. A three-sided tube of pasteboard, of the size of the larynx, with certain marks upon its inner surfaces is then substituted for the sheet of paper, printed page, or laryngeal picture, and the mirror is then held above this so as to reflect the image of its interior; and the exercises are repeated. The difficulty of reaching a desired spot is now rather greater than before, and this compels the student to learn to raise the handle of his instrument if he wishes to touch the anterior surface of the tube, and to depress it in order to carry the point of his instrument towards the posterior portion of the tube, as also the proper movements to the one side or the other.

---

[1] *The Medical Record*, Sept. 1, 1867.

Fig. 64.



Mounted skull for preliminary practice in the operative procedures of intra-laryngeal surgery (after Tobold). A perforated tracheotomy-tube, with tracheal mirror, is inserted into the trachea.

After this a papier-maché model of a larynx is employed as a means of exercise; and finally, the method introduced by Tobold, which is, to mount a recently excised larynx with the tongue, soft palate, etc., upon the rod supporting a mounted skull with the jaws separated; the œsophagus being tied around the rod. Where a recent human larynx cannot be obtained, a wet preparation or a dried one, an artificial one or one from one of the inferior animals, is substituted.

After a certain amount of facility has been acquired in this way, it is necessary to learn how to manage the mirror and operating instrument with artificial light. This is best done by suspending the model or mounted skull within a box having a small opening to represent the mouth in its relative position; and then the light is to be thrown in upon the parts, and the manipulation proceeded with as before.

Even after all this preliminary practice, it will require a great deal of patience to learn to use instruments upon a patient in whom nervousness, and the natural irritability of the structures, will cause more or less movement of the parts, whose reflex must be followed promptly and accurately in order to insure precision of application. This is especially necessary when the desired application is to be limited to a small area of diseased structure.

The principal rule to be observed in all these manipulations, be they what they may, is:

To carry the instrument well towards the mirror, until its point is visible in the image, and not to lose sight of the point during the operation.

Frequently, the instrument will have to be withdrawn again and again before a favorable opportunity is presented for carrying it home; but with increased practice, the expert soon becomes able to succeed at almost every attempt.

We can, in this way, not only make local applications of a general nature, such as swabbing, syringing, etc., but we can cauterize circumscribed ulcers; open abscesses; ligate, excise, twist off, or crush up tumors; scarify granulations and tumefactions; electrize individual muscles; in fact, perform almost every surgical operation not necessitating dissection; and this, without compromising the integrity of the healthy structures in the neighborhood of the operation.

The instrument which is to be carried into the larynx must be constructed with a suitable curve or angle. The angle most generally serviceable is one of perhaps 112°, but if it be a little greater or a little less, it will make no material difference in most cases. The angular instrument will occupy more room in the pharynx, but, in certain instances, is advantageous by the room it gives to avoid touching the epiglottis unnecessarily. The laryngeal portion of the instrument may vary from an inch and a half to three inches in length, and the handle or stem from six to eight inches. Under certain circumstances the usual form of the instrument may be conveniently departed from in consequence of peculiar conformation of the larnyx, or where it is intended to operate upon the anterior or the posterior portion of the tube. In the former instance the angle may be more acute, and in the latter more obtuse; otherwise, the necessary depression or elevation of the hand to reach the desired spot, will exact unusual skill on the part of the operator.

The management of the head and tongue of the patient had better be left to himself. If he is a little nervous his head may rest upon the breast of a friend, or against a special head-rest similar to that used in photography.

When the tongue is fleshy or very unruly, a tongue-depressor may be necessary to control it.

Light, patient, tongue, etc., being in proper adjustment, the operator introduces the mirror with one hand, while with the other he takes up the operating instrument and passes it well back into the pharynx and close to the mirror, carefully avoiding contact with any of the structures; then, with the image of the laryngeal mirror, as the "guide to the operating hand," the point of the instrument is to be directed towards the desired spot, and, following the reflection, is to be carried there promptly and quietly. The instrument must be taken in hand as if it were a pen,—not as if it were a cart-whip, a position in which too many are apt to hold it,—and the fingers being extended on the wrist, the laryngeal portion is to be carried over the tongue, until its approach is seen in the mirror. Instruments for special purposes are provided with rings and buttons for the thumb and fingers. It is not always, even after long practice, that the actual contact of instrument with the diseased spot can be recognized in the mirror, for usually, and nearly always at a first application, spasmodic action ensues at the moment of contact; and sometimes the instrument, if not withdrawn, will be caught upon the epiglottis or upon the base of the tongue; an occurrence which it is desirable to be able to avoid; although under certain circumstances, as when a general application is being made by means of a moistened sponge, the action may be advantageous by compressing the sponge and thus forcing its contents out upon the parts. Under these circumstances the character of the contact is to be determined by the impression conveyed to the finger by the end of the instrument. As soon as practicable after the operation, which means as soon as the spasmodic action it excites ceases, the parts are to be examined in the usual manner, in order to judge of the success of the application or the necessity for its repetition.

Patients soon become accustomed to the momentary contact of a foreign body against the laryngeal mucous membrane; but at the earlier applications the distress is often very great indeed. There is a great deal of spasm with choking sensations, and expectoration, at times associated with cough; while the sense of constriction and dread of suffocation sometimes endures for several minutes. The same sensitive effect occurs as when a foreign body has been removed from the conjunctival mucous membrane, in the continuance of the sensation its presence produced. From a similar cause patients will continue to feel as if the sponge were in the throat after it has been withdrawn, and this will sometimes keep up the feeling of impending suffocation, though sometimes there will be actual spasm, so that all the distressing symptoms of strangulation will be presented. A few forced expirations, or the inhalation of a whiff or two of chloroform, will soon control the spasm if it does not subside promptly. With each repetition of the application, however, the sensibility of the parts decreases, until, after a while, the operation will be followed by a mere hawking or clearing of the throat. In the earlier applications, too, the effect will be to induce active congestion of the parts, with increased secretion followed by a sense of rawness, dryness, or burning, in greater or less degree, and continuing for a period varying from fifteen minutes to several hours. As the applications are repeated these effects, too, gradually diminish in intensity. The swallowing of cold water will materially alleviate this distress when it is severe; and if it continues for some time the inhalation of an anodyne solution or vapor will overcome the irritation.

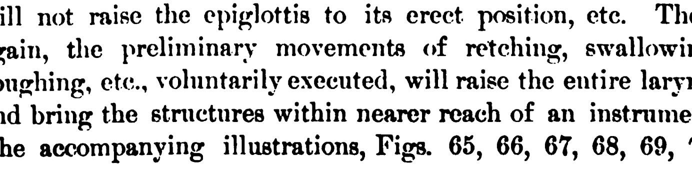
Very often a successful application or operation can be made at the first attempt; but in all cases of extreme irritability of structures a certain amount of preparatory manipulation is necessary. The best method of inducing tolerance of manipulation is by the repeated contact of an extraneous body. We may instruct the patient how to pass an instrument into his own larynx, a probang armed with a small sponge, for instance, and direct him to insert it two or three times a day until the contact of the instrument can be endured without flinching. This practice may be at times necessary anterior to the employment of cutting instruments or forceps in the removal of growths, etc.; less so when cauterization or general applications are to be instituted.

Very often the epiglottis is more irritable than the interior of the larynx, and to overcome this the best plan is for the operator to pass his finger behind the patient's epiglottis, and pull it forward several times, and then to teach the patient how to perform the manœuvre himself, and direct him to repeat it occasionally, at intervals during the day. Then he may be provided with an extension thimble, with a good, broad, blunt end, and insert that several times a day. When the epiglottis is very much depressed, the patient must pull it forward frequently, so as to induce it to assume a more erect position. A patient can be taught to raise the epiglottis with one forefinger, and then to pass a sponge probang along the back of the finger down into the larynx. By this, or some similar method, the sensibility of the part will be gradually subdued; and it is surprising sometimes how soon the irritability is overcome. And here we are led to make an important practical observation, which is, that a patient who has been suffering a long time with severe disease, even when of nervous temperament, will learn to control his sensations promptly, while one whose trouble is trivial or imaginary, will require longer tuition and preliminary manipulation. Again, it will be noticed, that a patient who may be exceedingly docile, and may co-operate well with his physician during the earlier interviews, will sometimes become less tolerant of manipulation as relief is being obtained.

Where obstinate depression of the epiglottis precludes the convenient introduction of an instrument, it will have to be forcibly raised by means of properly curved forceps, hooks, or pincettes, of which that of Von Bruns is, perhaps, the best.

Certain precautions are necessary to success in limiting a local application to certain portions of structures, and in order to gain access to others; and for this purpose we avail ourselves of the physiological effect of voluntary movement. Thus, if we want to medicate the floor of the glottis, or prevent any of the material used from entering the trachea and lower laryngeal cavity, we direct the patient to emit a vocal sound, which of course closes the glottis; if, on the contrary, we desire the instrument to enter the lower laryngeal cavity, or penetrate into the trachea, we direct a deep inspiration to be taken which opens the glottis and permits the passage of the instrument between its lips; if we wish to make an application to the laryngeal surface of the epiglottis, or to the anterior portion of the vocal cords, ventricular bands, etc., we direct the forcible extension of the tongue, and the utterance of a note of high pitch, or an ironical laugh, in order to expose these structures more fully; if we wish to touch a spot upon the lingual face of the epiglottis, or in the glotto-epiglottic sinuses, or upon the base of the tongue, we allow the base of the tongue to remain in a more natural position, or cause it to be protruded in such a way as will not raise the epiglottis to its erect position, etc. Then, again, the preliminary movements of retching, swallowing, coughing, etc., voluntarily executed, will raise the entire larynx, and bring the structures within nearer reach of an instrument. The accompanying illustrations, Figs. 65, 66, 67, 68, 69, 70,

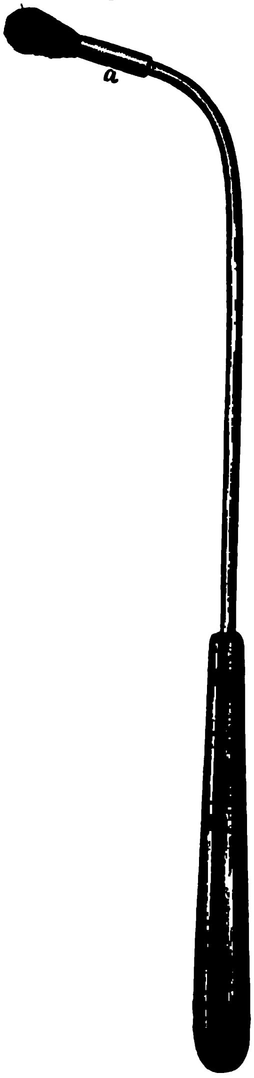
Fig. 65.



Laryngeal brush and sponge-holder.

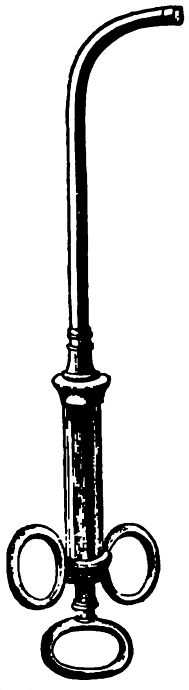
exhibit at a glance the form of instruments most convenient for making topical applications to the larynx in the treatment of laryngitis and other affections.

Fig. 66.



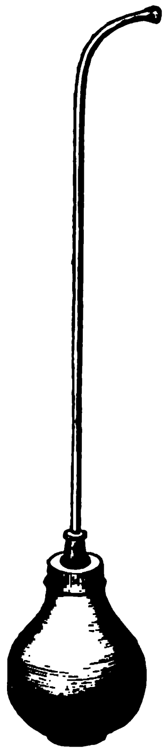
Türck's laryngeal brush.

Fig. 67.



Tobold's laryngeal syringe.

Fig. 68.

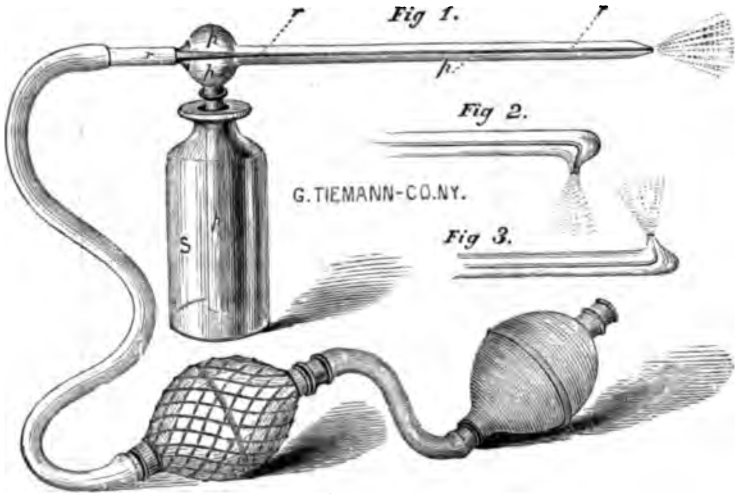


Gibb's laryngeal douche.

Fig. 67 represents a very convenient syringe, the nozzle of which is of hard rubber, with a silver tip pierced with several fine holes, to permit of the better distribution of the fluid. The barrel is of glass, and the piston-rod, if desired, can be graduated, so as to secure accuracy, if deemed important. The rings on the barrel are for the first and second fingers; the ring on the piston-rod for the thumb. Its manner of employment is obvious.

For projecting a finely divided douche into the larynx in the form of a spray, which shall irritate the parts less than an injection from a syringe, the best instrument which has been devised is the laryngeal douche of Dr. Gibb, of London (Fig. 68). It consists of a silver tube, to the free extremity of which there is screwed on a platinum bulb, perforated by a number of exceedingly minute openings. The other extremity of the tube is fastened within the neck of a rubber ball. The instrument is charged by dipping the bulb into the solution while the ball is compressed, and then releasing the ball. It is discharged by compressing the extremity of the ball with the thumb, while the tube is held between the first and second fingers.

Fig. 69.



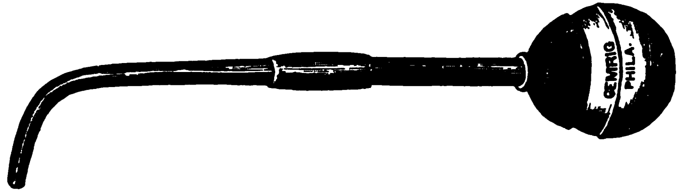
Newman's spray-producer.

The spray-producer, (Fig. 69) devised by Dr. Robert Newman, of New York, is constructed on the principle of one capillary tube inclosing another. The double air-chamber of the rubber tube presses the air through the inner tube *r r*, and directs the spray. The same movement exhausts the air from the outer tube *p p*. As soon as there is a vacuum in the outer tube, the fluid from the vial *S* is forced upwards into it, and surrounds the inner tube. The continued pressure forces the fluid through the small opening, and produces the spray. The fluid is carried in the outer tube—the air, which makes the spray in the inner tube. The opposite mechanism—*i.e.*, the inner tube carrying the fluid, and the outer the air, will produce the same effect. Instruments constructed according to the latter theory have been made by the same artist, and work well. These nebulizers are made to direct the spray in different ways: upwards, downwards, or straight forward. Either of these directions is produced by the end of the inner tube, which conveys the air. But in either case the instrument is only one piece of machinery. Fig. 1 represents the straight nebulizer in operation; *p p p* is the outer tube; *r r* inner tube. *S* the vial with the medicated fluid.

Fig. 2 is the end of a nebulizer turned downwards for the larynx, etc., and Fig. 3 the end of another which sprays upwards for the posterior nares.

These instruments possess many advantages. They are clean and do not decompose the solutions; produce a fine spray; never need repairs, and are easily kept in order. They are not patented. Hence, they are strongly recommended.

Fig. 70.



Rauchfuss' laryngeal powder-insufflator.

For projecting powders into the larynx, the insufflator of Rauchfuss (Fig. 70) is admirably adapted. The powder is inserted into a slot, which is then covered by a slide. The instrument is then discharged in the same manner as Gibb's douche.

The employment of powders for purposes of general medication of the larynx will sometimes be found much less irritating than the use of solutions. These powders must be properly diluted with some innocuous material.

ELEPHANTIASIS OF THE LARYNX.

There is no doubt that the larynx is peculiarly affected in elephantiasis, but the accounts given of the condition are too meagre and conflicting to admit of any satisfactory analysis. There appears to be more or less catarrhal inflammation, with hypertrophy of some portions of the laryngeal structures, and destruction of tissue in others. Gibb[1] speaks of a peculiar shrillness of the voice, the production of which hardly appears to be accounted for in his description of the affection. Wolff,[2] who has examined a number of cases in the island of Madeira, does not mention this peculiarity of voice. He speaks of a fatal constriction of the larynx, and also of œdema rapidly fatal; a condition which Norwegian physicians[3] have often encountered. This affection is usually connected with a similar condition of tongue and pharynx, and, according to the belief of Mackenzie,[4] never attacks the mucous membrane until after it has manifested itself upon the cutaneous surface.

INFLAMMATIONS OF THE TRACHEA.

The trachea is liable to inflammation and its products, and frequently participates in the diseases affecting the larynx. Occasionally, however, the disease is confined to the windpipe.

Acute inflammation of the trachea occurs sometimes as an idiopathic affection, sometimes as a symptom of small-pox, measles, typhus, pulmonary tuberculosis, croup, etc. Pain referred to the windpipe and to the top of the sternum, an expectoration of mucus, sometimes in regular rings, and the accompaniment of a peculiar brazen-like cough, are the main features of differential diagnosis, from laryngitis bronchitis, or general catarrhal inflammation of the air-passages. If the disease is confined to the trachea, there will be no hoarseness. In favorable cases, the parts can be examined with the laryngoscope. The mucous membrane covering the rings and inter-cartilaginous spaces, will be more or less red or dark red in color; but this appearance is not to be depended on as a certainty in diagnosis.

---

[1] On the Throat and Windpipe, p. 273.

[2] De Lepra Arabum (Elephantiasis Græcorum). Virchow's *Archiv*, 1863, Bd. 26.

[3] Türck, op. cit. p. 429.

[4] On Growths in the Larynx, p. 36.

Chronic inflammation of the trachea accompanies follicular pharyngo-laryngitis, pulmonary tuberculosis, and syphilis. The mucous membrane is dark red, as seen on laryngoscopic inspection, and clumps of mucus are usually adherent, here and there, to the cartilages or interspaces. Though usually associated with chronic laryngitis, this affection is sometimes met with alone. The chronic inflammation accompanying tuberculosis and syphilis is apt to extend itself to the submucous tissues, in some instances to invade the cartilaginous structures, producing extensive and irremediable destruction of tissue, of which, as a rule, no adequate conception can be obtained, even by the use of the laryngoscope, until an examination of the parts after the death of the patient. Papillomatous vegetations similar to those produced in the analogous ulcerations of the larynx are occasionally met with.

Syphilitic ulcerations, in addition, and sometimes tuberculous ones, are apt to be accompanied in their cicatrization by a contraction sometimes amounting to stricture, a condition usually irremediable if below the point at which a tracheotomy can be performed. A constriction sometimes results from submucous infiltration of the lining membrane of the trachea. A very remarkable case of this kind is recorded in the volume of Dr. Gibb.[1]

The treatment of inflammation of the trachea would, in the main, be that employed for acute laryngitis, only much less active. This would consist in rest, warm water poultices externally, the inhalation of steam, impregnated, if desired, with balsamic or anodyne substances, and a mild antiphlogistic course internally. An acute attack might, in its earliest state, be aborted by means of a large dose of opium, or the local application of a strong solution of nitrate of silver. Chronic inflammation of the trachea requires treatment similar to chronic laryngitis. The local applications may be made with the sponge probang, or with Gibb's douche. The latter instrument can always be used to propel solutions down the trachea; the passage of the sponge requires special skill in manipulation. Sulphate of zinc or the nitrate of silver would be found most universally applicable for the local treatment of chronic tracheitis. I have seen a great deal of benefit result from both of them. The treatment for chronic tracheitis accompanying tuberculosis and syphilis would be that detailed for the chronic laryngitis attending these diseases.

---

[1] On the Throat and Windpipe, 2d Edit., p. 397.

A somewhat remarkable case, from the author's practice, is given in this connection.

Chronic inflammation of the Trachea, of Forty Years' Standing, cured by Nitrate of Silver.—Hannah L——, æt. 45, called upon me (April 1, 1867) at the recommendation of Dr. Atkinson, with reference to treatment for a chronic sore throat, which she had had as long as she could remember. It must have existed then for at least forty years. There was evidence of congestion, on laryngoscopic inspection, clear down the trachea. There were several warts on the posterior portion of the tongue, to the left side, seemingly of textures similar to that of the tongue, and perhaps enlarged or aggregated papillæ. There were a number of cutaneous excrescences on the face.

A sponge saturated in a solution of nitrate of silver, sixty grains to the ounce, was passed down the entire length of the trachea, thoroughly swabbing the parts, every other day. Within a week, the relief to all the tracheal symptoms was marked. The frequency of the application was diminished, and in little more than two months she was discharged from treatment, the cure apparently complete. More than a year afterwards, perhaps two, Dr. Atkinson informed me that the relief had been permanent.

The author saw a case of ulceration of the posterior wall of the trachea, in the body of a young man who died suddenly, suffocated by an accumulation of blood in the trachea, and the post-mortem examination of whose body he was invited to perform by Dr. Shapleigh. There was no evidence of phthisis; and the larynx was normal. There had been hoarseness during life and occasional hemorrhage, the earliest indications having commenced three years before death, and subsequent to a garotting by highwaymen. The ulceration was apparently the result of simple inflammation, non-specific and non-tuberculous.

CONSTRICTION OF THE TRACHEA.

Constriction of the trachea may be produced by the presence of aneurismal or other tumors outside of the windpipe. This condition is to be carefully discriminated from stricture of the tube, the result of disease of the trachea itself.

The constriction may be due to compression by an aneurism of the aorta, cervical abscesses, enlarged lymphatic glands, tumors of the neck, benign and malignant, goitrous and other tumors of the thyroid gland, etc. The symptoms of this condition of things would be those of impeded respiration, in marked cases amounting to dyspnœa, and in severe cases proceeding to asphyxia. The existence of a tumor in the situations mentioned would lead to the suspicion of compression of the trachea if dyspnœa were present. Still this symptom might exist independently of any compression of the trachea, being produced by compression of the nervous trunk. Compression of the main nerve, or of the inferior laryngeal fibres, would in like manner produce aphonia, which may therefore coexist as a symptom of compression upon the trachea from the outside. The encroachment of the tumor upon the calibre of the tube has often been observed in the laryngoscopic mirror. Türck[1] mentions several cases of this kind, and depicts the images seen in the laryngoscopic mirror.

The treatment for this condition should be directed to the cause producing it, as the sole means of remedy. Only in cases where the tumor was high up in the neck could any hope of relief be held out from the operation of tracheotomy.

---

[1] Op. cit., p. 507 *et seq.*

Constriction of the trachea, the result of a cause of an entirely different nature sometimes exists, and may be mistaken for constriction from a tumor whose presence cannot be determined. For a knowledge of this affection we are indebted to Dr. S. Scott Allison,[1] who has pointed out a condition of the trachea giving rise to suspicion of tubercle of the lung, and involving the form and calibre of the trachea, and which has received little notice from pathologists. This condition he describes as one of constriction of the tube immediately above its bifurcation. The extent of narrowing varies, but is very manifest to the eye in many cases. It affects the whole circumference of the tube, and does not proceed from projections at particular spots. The cartilages remain of normal length, the soft parts of the posterior wall only being reduced in breadth. This is very obvious, and depends usually on undue muscular contraction. No morbid lesions are found, saving narrowing and over-vascularity, and some thickening of the mucous membrane; the calibre of the narrowed part being unduly less than that of the trachea in its upper part.

The symptoms which this condition induces are described as difficulty in both inspiration and respiration, with auscultatory constrictive phenomena at the sternum, great sense of oppression in the region of the sternum and adjacent parts of the chest, liable to exacerbation on exposure to cold, and on occasions of increase of vascular congestion, or of spasmodic action. It may give rise to emphysema.

A similar condition of the trachea is described as occurring in the latter stages of pulmonary tuberculosis, but of course there would not be any doubt then as to the diagnosis.

The affection under consideration is looked upon by Dr. Allison as comparatively safe and generally local, despite its occasional accompaniments of general derangement of health, loss of flesh, cough, and occasional streaky hemoptysis. Such a case would be treated by the writer by the passage of a sponge loaded with a solution of nitrate of silver.

---

[1] On Morbid Throat, in relation to Consumption. London, 1869, p. 12.

FISTULE OF THE LARYNX AND TRACHEA.

A fistule of the larynx or trachea is occasionally met with as a congenital affection. There is a slight discharge of mucus or muco-pus at the external opening; and it is differentiated from fistule of the pharynx or œsophagus, or a fistule connected with one of the bursæ in this region, by the passage of an exploring probe into the air-passage, or the egress of air from the interior.

A subcutaneous fistule of the larynx or trachea is sometimes present, of which I have seen two examples; one in a young man, a journeyman cigar-box maker, and the other in a young lady with enlarged cervical glands and aphonia. The symptoms in both these cases were very similar. A sudden emphysematous swelling would appear in front of the neck and under the jaw, in one instance pushing the tissues forward beyond the chin, and of course producing great deformity. Sometimes the occurrence would take place within a few minutes, and sometimes the tumor would not attain its greatest size under several hours. It would gradually subside spontaneously in the course of a day or two, or under the influence of friction externally, but sometimes remain for three or four days. Though making its appearance often under the influence of emotion or exertion, it would occur sometimes without any apparent cause.

There being no reason to believe in the spontaneous evolution of gaseous products in the necks of these individuals, it was presumed that a fistule existed beneath the skin, communicating with the larynx or trachea. No internal evidence of fistulous opening could be discovered with the laryngoscope. The condition is technically known as pneumatocele.

The subject of traumatic fistule is spoken of in connection with the subjects of wounds and fractures of the larynx and trachea.

CROUP.

Croup is a peculiar exudative inflammation of the mucous membrane of the air-passages, or of the muciparous glands upon their surface, with a marked disposition to the induction of paroxysmal spasm of the muscles of the glottis, and, perhaps, also of paralysis of the nervous fibrillæ distributed to the minuter bronchi. It affects the mucous membrane of the larynx and trachea chiefly, but sometimes extends into the bronchial tract, and not unfrequently implicates the pharyngeal mucous membrane also. It is a disease which attacks the adult occasionally only, the greatest predisposition being confined to a period extending from the first or second to the tenth or twelfth year of life; although it is sometimes encountered in the unweaned child. From some cause as yet undetermined, male children are attacked more frequently than those of the other sex. Inasmuch as the disease is most prevalent during the period of the first dentition, it may be supposed that the indiscreet use of food unsuited to the masticatory and digestive organs of the child has some influence on the development of this peculiar form of exudative inflammation, or at least on the fostering of a predisposition to it.

The disease, especially in its fully developed form, is notoriously fatal, and it is always of a serious character, not from the amount of inflammatory action alone, for that is comparatively insignificant as an element of danger, but from the location of the exudative product, and, in a less degree, from the complication of spasm of the glottis; both of which effects may eventuate in suffocation.

The exciting cause of croup is not well understood, but it seems, in the majority of instances, to follow, more or less, exposure to cold; sometimes very little exposure indeed.

There seems to be three distinct varieties of this disease, one of which is catarrhal, with an exudation of mucus merely; another is fibrinous, in which a distinct pseudo-membrane becomes deposited, either from coagulation of the exuded albuminous or albumino-fibrinous materials, or from evaporation of their watery constituents; and a third variety, which is but seldom encountered, in which there is an actual production of pus.

Laryngismus stridulus, spasmodic or false croup, is a nervous affection, and should not be included in an account of inflammatory croup.

There is spasm of the glottis in almost every instance, though there is great variation as to the frequence of the spasm, and the violence of the paroxysm. There is also great difference in the amount of dyspnœa, which usually presents paroxysms of temporarily increased difficulty of respiration. This dyspnœa is sometimes wholly inadequate for satisfactory explanation by reason of the amount of exudation; and this it is which seems to point out the existence of an element of paralysis affecting the nervous distribution at the ultimate bronchi.

Croup is usually dependent upon causes of incidental origin, but there appears to be no doubt that it is occasionally epidemic. Certain diseases affecting the mucous membranes secondarily or primarily, such as influenza often, measles frequently, and, to a certain extent, scarlatina, seem to induce a prevalence to the production of croup.

The catarrhal form of croup is by far the most frequent; and both the membranous and purulent varieties are apt to begin in the catarrhal form.

There is usually a little febrile movement at the commencement of an attack of croup, without being necessarily preceded by any great amount of chilliness, though it is often difficult to ascertain the truth as to this point. The indisposition of the child generally attracts attention for the first time towards evening, the child speaking with a voice indicative of having contracted a cold, and coughing a little, but not yet with the peculiarity to be described as characteristic of the affection. Still, there are observers who assert that an acute ear is able to detect the peculiar quality of the cough from its very commencement. Sometimes, for two or three days, the symptoms are only those of slight catarrh. After a day or two—it may be four or five—towards night, there gradually appears a slight flush upon the countenance of the child, with an abnormal brilliancy of the eye, some increased heat of skin, and a quickness and fulness of the pulse. At a period varying between an hour or two before midnight, or thereabouts, the child is likely to be awakened by the onset of an attack of dyspnœa, which is often the first symptom exciting the alarm of its parents; but sometimes this does not occur until early in the morning; and it is at this period usually that the peculiar character of the cough is detected. This cough is very characteristic, and is recognized when first heard by a medical practitioner, and remembered ever after. A description conveys no adequate idea of its peculiarity. It has a specific ring to it, which has been compared to the crowing of a cock, and to the resonance of a brass tube.

The cough is at first sonorous, but undergoes gradual changes into huskiness, and finally in some instances becomes almost toneless, the child being seen to cough but not heard in so doing. The voice, which is at the first nearly natural, becomes hoarse and dissonant, acquiring a peculiar quality suggestive of the characteristics of the sound of the cough; and, as the disease progresses, it changes into a dull husky laryngeal whisper, which gradually becomes extinct. The dyspnœa increases likewise, until finally there are presented all the phenomena of struggling for breath, with distention of the nostrils, protrusion of the eyeballs, clutching at the throat, and grasping at the arms of the attendants, as though to find a fulcrum to aid the action of the muscles of respiration; the flush disappears from the face of the child, which becomes pale, more or less purplish, while, at the same time, there is lividity of the lips, and an anxious expression of countenance, indicative of the greatest distress.

These severe symptoms are not always manifested on the very first day of the disease, but come on gradually in the course of two or three days, and with increasing significance. In the early stage of the affection the only source of immediate danger to life exists in the paroxysmal spasm of the glottis; but at a later date, when the exudative process has become fully developed, there is superadded a danger of suffocation in consequence of the obstruction of the air-tube.

Croup may run its course to a fatal termination in forty-eight or even twenty-four hours, but this is unusual; its general duration being from five to eight days, though cases are occasionally encountered in which the attack continues for two or three weeks, or even longer according to some observers, and in some instances a continuous liability to its attacks seems to be kept up for a period of several months.

In the absence of direct or laryngoscopic inspection of the deposit, the only certain diagnosis in a case of membranous croup is the expulsion of some of the products of exudation. These may appear in irregular flakes, or as thickened mucus; in some instances large flakes are coughed out bearing the impress of the tracheal cartilages, sometimes in shreds, sometimes in rings, sometimes in tubes, sometimes in solid balls. Instances are on record in which regular casts of the trachea and portions of the bronchi have been expectorated, and similar casts of great extent have been found, not infrequently, on post-mortem examination. The appearance of fibrinous deposits upon the tonsils, palatine arches, or pharynx, is also indicative of the nature of the disease, but is by no means to be relied on as an essential feature. Laryngoscopic inspection, in the hands of very skilful manipulators, has detected the presence of the membrane within the larynx and the trachea, even in very young children. In children of four or five years of age and upwards, such an examination offers no great difficulty to execution. When there are no evidences of this kind upon which to base a judgment, the case is supposed to be croup from the general symptoms, coupled with the history of the case; and if there is any doubt upon the subject the case is to be treated as though there were no doubt at all of its being croup, in order to secure the advantage of judicious treatment in the early stage, a point of great moment in the management of this dangerous and often insidious disease. Croup is one of those diseases in which early attention will have a very great influence upon the result, an influence often of life over death; and it is therefore incumbent upon the physician to avoid any unnecessary delay in rendering service. Were this the rule more than it is, better results, perhaps, than are usually observed would follow the treatment of croup.

The treatment of croup is a subject about which there is very little uniformity in the practice of physicians. To designate, merely, the various methods that have been recommended, would require many pages. All that the author can do, in the space allotted to this topic, is to describe the plan of treatment which seems to him most rational, and which, with such modifications as each individual case has required, has best served the purpose, in the actual test of his practice. The main principle in view is to sustain strength while assisting the patient through the natural course of the disease.

The most frequent variety of croup is the mucous or catarrhal form, in which there is little disposition, if any, to the congellation of the exudation into a membrane. The treatment of this form would be but little different from that of a case of ordinary catarrh, save that the patient would be kept in bed, in a well-ventilated room warmed to a temperature of not less than 80° F., and that the air of the apartment would be kept very moist by means of an atmosphere of steam produced in one of the methods to be described presently. If the child were too young to make voluntary efforts at expectoration, an emetic of alum, as employed by the late Prof. Meigs, would be given about twice in the twenty-four hours, in order to provoke expectoration during the act of vomiting, and this only for the reason that the air-passages of children are too tolerant of mucous accumulations, to run any risk of their increasing to such extent as to offer any unpleasant mechanical complication during the management of the case. The bowels would be kept open, if need for this appear, by the oleaginous mixture or by bicarbonate of soda, or some other gentle laxative. The diet would consist of milk if the child be young; or of beef tea and other meat broths, or soups with a moderate allowance of farinaceous food, if the child be a few years of age. If symptoms of debility present themselves, quinine and iron, preferably in the form of the muriate, would be administered. And finally, if there were a good deal of inflammatory action in the parts, the throat would be enveloped in a wet cotton poultice, covered with oiled silk.

Where there was reason to suppose that the exudation was being deposited in the form of a membrane, the treatment would be more active. The temperature of the apartment would be kept at from 85° to 90° F., and the atmosphere would be more loaded with steam; with the object in view of supplying, to the exudation, water to replace that which is lost by evaporation or coagulation of the exudation in the formation of the membrane. With this view, I have often maintained so great an evolution of steam that the paper of the room has hung loose from the walls. Where a stove can be placed in the room, a large vessel of water containing a few towels is placed upon it. The presence of the towels or napkins, or whatever may be employed, assists the evolution of the steam. If this be insufficient, wet cloths are hung upon chairs and arranged near the fire, the cloths being wet again as soon as they become dry; a clothes-line is hung in the room and wet sheets and other articles placed upon it. Under other circumstances I have had the family wash-kettle brought into the room filled with boiling water, and kept a servant by it, constantly lifting out articles of clothing and again immersing them. At the same time a second wash-kettle is on the kitchen fire, ready to replace the one in use as soon as its water fails to give off sufficient steam. Buckets of water into which hot bricks and bits of heated iron are thrown, also afford a method of keeping up a supply of steam. In summer-time, and at other times where a stove cannot be procured, a gas stove may be fed by the illuminating gas and furnish a means of warmth; while the croup-kettle now furnished by the surgical instrument makers can be placed upon it for the purpose of affording the steam; and this plan has the advantage that by means of long tubing the entire apparatus can be brought close to the bedside of the patient. The air of the apartment is kept ventilated by opening a window in an adjoining room or staircase, a screen formed by a sheet or quilt upon a line being placed in front of the door of communication so as to screen the patient from draught. This temperature and steaming is kept up night and day, as long as there seems any occasion for it, the amount of heat and steam being then lessened gradually. In order to assist in the destruction of the membranes as soon as formed, and to afford inlets through them for the watery vapor to get beneath them so as to facilitate their removal without waiting for the period of suppuration, resort is made every half-hour, hour, or two hours, as the case may seem to require, to the inhalation of the vapor from slackening lime, as recommended by Dr. Geiger—a method much better than that of nebulizing the lime-water into spray. Where the vapor charged with lime does not seem to be doing good service, I have sometimes met with good results from the use of bromine inhalations as recommended by Ozanam, the formula being a grain of bromine, a drachm of bromide of potassium, and an ounce of water, which quantity is nebulized into spray by the steam apparatus, and diluted only so far as the case may seem to require. Alternation back to the lime after the use of the bromine, seems sometimes to be indicated and to offer good results. These inhalations are continued from ten to twenty minutes at a time at suitable intervals night and day, irrespective of sleep, and very often succeed in forcing the detachment and expulsion of shreds of membrane, sometimes in copious masses. They are intermitted from time to time, if the respiration has remained much improved for a number of hours continuously, and are resorted to again upon the least sign of any fresh embarrassment in breathing. Care must be taken in some instance to remove the secretions from the mouth, as they sometimes accumulate there and may prove dangerous.

There is great risk, in this treatment, of exciting catarrhal bronchitis or pneumonia, conditions which often occur without the treatment, but the risk of this is not greater than the risk of death under inefficient treatment; and if the child is saved from death by the croup, we have a fair opportunity to carry him through his pneumonia by being on the alert to detect its earliest manifestations. At least, I have never seen death from this cause after a successful management of the croup by the method narrated, although I have sometimes been mentally prepared for it. The emetic, in young infants, in this form of the disease, is given at intervals of not longer than six hours, as long as there remain any evidences of continued formation of membrane; and if the alum prove insufficient for the purpose, as it sometimes will, I resort to a strong decoction of senega, or to ipecacuanha, never to tartar-emetic, and rarely to sulphate of copper or the turpeth mineral. The picture that Prof. Niemeyer has drawn of an infant bathed in the bluish excretions from its rectum, when the emetic has ceased to operate upon the stomach, is too horrible for one to wish to persist in the use of sulphate of copper once it has proved inactive.

Opium, in the form of paregoric or otherwise, or belladonna, or some other narcotic remedy, is sometimes required as a means of repressing the tendency of spasm. The warm-water dressing is kept applied to the outside of the throat, and sometimes replaced by a flaxseed poultice.

In addition to the nourishing diet and tonic treatment resorted to in the milder cases, systematic stimulation with alcohol and with carbonate of ammonia is employed. Time and again I have seen a full dose of carbonate of ammonia rouse a child from complete exhaustion, and tide its fleeting life over the ten or fifteen minutes necessary to administer the inhalation of the vapor of lime, or the spray of bromine, affording another chance for the detachment of newly-formed membrane. When cerebral symptoms supervene, I resort to calomel in small and frequent doses. I have never had occasion to resort to tracheotomy to save the life of a child with croup. Should, however, a case occur, in which the method of treatment narrated, fairly carried out, failed to afford relief, and in which it was not evident that the exudation occupied the bronchial tubes, I would resort to tracheotomy as soon as there was any evidence of continued dyspnœa threatening suffocation, without waiting for the actual symptoms of impending asphyxia, in the conviction that an early performance of the operation offers the best chance of saving life by it. But it is due to the treatment above narrated to say, that I have seen the life of a patient preserved through it, if not by means of it, for whom the performance of the operation of tracheotomy had been declined by more than one surgeon, as offering no chance of a successful result.

The local application of solutions of nitrate of silver, a drachm and more to the ounce, has been highly extolled by Prof. Green, Dr. Gibb, and many others, and is very beneficial in many instances, in some of them, doubtless, by the mere mechanical detachment of the membrane removed by the contact of the sponge in the performance of the operation. It is only upon this view that we can explain the benefit attributed to very indifferent substances employed in the same manner. The salts of iron are sometimes employed in the same way as the nitrate of silver. I have never felt any inclination to employ local remedies in this way, though as bold as most practitioners with regard to manipulation within the larynx. The inhalation of sulphuric ether, so highly extolled in the journals a few years ago, I tried, at the time, in two or three cases in the manner described by those who recommended it, but without witnessing any result which seemed to justify any further resort to it. In one instance, in particular, that I well remember, and to which I was called too late to allow any time for the action of the vapor of lime, which had been used slightly but not with the requisite pertinacity, and in which it was evident that tracheotomy was inapplicable, the ether was tried, but without producing any of the favorable results recorded as having occurred under similar circumstances.

A child who has passed through an attack of membranous croup, especially if it has been actively treated on the steaming and inhalatory principle, should be confined to the house for a long time, and the greatest circumspection should be exercised with regard to its diet and clothing. The reduction of the temperature of the bed-room to that of the rest of the house should be accomplished gradually, and not occupy less than forty-eight hours. The voice of the patient who has had membranous croup does not always return at once; sometimes weeks and even months elapse before the voice becomes natural again. This is due sometimes to infiltration or thickening of the vocal cords, and sometimes to the formation of little vegetations upon them, or in their neighborhood. Both of these conditions seem to subside gradually without the intervention of any special treatment. Should such treatment seem indicated, iodide of potassium or muriate of ammonia, perhaps, would present itself as the most suitable remedy; assisted, probably, by the daily inhalation of a spray of a weak solution of tannin or other astringent.

With regard to inhalations of lactic acid, as recommended by Dr. Weber, and inhalations of sulphurous acid, sulphuret of mercury, and other substances said to be able to disintegrate the membrane, I can only say that, in my own hands, they have not produced results as apparently beneficial as the lime and the bromine; and though I have resorted to them occasionally, I have always felt disposed to fall back upon the lime and the bromine.

The use of the inhalation of oxygen gas has been recommended in the treatment of croup as a means of counteracting the baneful effects of the carbonic acid producing the asphyxia, and in the hands of Beigel, Michel, and others, has proved occasionally successful. It has even been proposed as a substitute for tracheotomy, but this it cannot be, as long as the aperture of the glottis is diminished by swelling or false membrane. Atmospheric air is wanted, not oxygen, and if the glottis be too small to admit of a proper supply, a larger opening should be made artificially for this purpose. If an operation of this kind is not indicated, it would appear more rational to employ a substance capable, under favorable conditions, of disintegrating the membrane.

The vapor of liquor ammonia, from a sponge held in the pharynx a few moments at a time, has been recommended by Dr. Daguillon, of Oran,[1] the parts being washed afterwards with fresh water.

The internal administration of cubebs, which certainly has a disposition to elimination by the bronchial mucous membrane, has been recommended by Trideau, C. Paul, and others, but I am unable to pass judgment upon it. It would be more serviceable in the catarrhal form of croup, reasoning from analogy, than in the membranous variety.

In order to insure the access of air to the lower air-passage without the performance of tracheotomy, tubage of the larynx has been recommended; but the results have not been very promising, tracheotomy having become absolutely necessary in a number of cases thus treated. The treatment is better in theory than in practice.

When tracheotomy is performed in the course of a case of croup, it should not be forgotten that it accomplishes but a single object, it permits a greater access of atmospheric air. The medicinal treatment is by no means to be interrupted. Indeed, the use of tonics and stimulants are sometimes more strongly indicated thereby from the fact that the child often experiences such difficulty in swallowing, that a proper amount of nourishment cannot be obtained by the mouth; and, in addition, he has to overcome the nervous shock incident to the operation. Great care is required as to cleanliness of the inner tube, for a double tube should always be employed. In some instances the irritation produced by the tube is so great as to necessitate its withdrawal, and the section of the sides of the wound, so as to secure an oval opening, at least the size of the normal glottis, for the access of air. The opening in the trachea affords an avenue for the direct introduction of local remedies, calculated to act upon the membrane, and this use of it may, no doubt, prove valuable in certain cases. Lime water, solutions of chlorate of potassa, chlorate of soda, etc., have been injected in this way with success. In this connection it may be well to mention that these substances have been injected directly into the larynx and trachea by means of a curved sharp-pointed syringe, rather larger than the hypodermic springe, plunged from the outside through the crico-thyroid ligament. It is a plan which would not appear, at first sight, to possess any advantage over the method of inhalation, and it may possibly prove directly injurious by wounding an artery of anomalous distribution.

---

[1] *Gaz. hebd.*, Nov. 30, 1870. **Ranking's**, Abst. Jan. 1, 1871, p. 65.

Dr. Sanne[1] has recently written an excellent volume of nearly 300 pages, on the Study of Croup after Tracheotomy, based upon eighty-three cases operated upon in the Saint Eugénie Hospital in 1868.

GROWTHS IN THE LARYNX.

Growths in the larynx are not of infrequent occurrence, though they were supposed to be very rare before the introduction of the laryngoscope as a means of diagnosis. Indeed, seventy cases, probably, would represent the entire number on record before the invention of that instrument, while since its use has become general, several hundreds have been recorded. The fact is, that the subjective symptoms to which growths in the larynx give rise were not such as to point prominently to the presence of a neoplasm, except in very marked cases; while, at present, it is so customary to make a laryngoscopic examination in diseases of the throat, that many tumors, or at least excrescences, are discovered whose existence would not have been suspected otherwise. The use of the laryngoscope, too, has taught us to interpret the subjective symptoms of this form of disease better than we used to do; and it is not now uncommon for one accustomed to meet such cases, to suspect their existence at once, by the voice and manner of the patient, before making any resort to the laryngoscopic mirror.

---

[1] Etude sur le croup après la trachéotomie. Paris, 1869.

The general symptoms of a foreign growth in the larynx vary with the size of the neoplasm and with its seat. Some growths give rise to no special symptoms at all, and, as already intimated, are accidentally, or rather unsuspectingly discovered upon laryngoscopic examination, undertaken with a view to determine the cause of an obstinate affection apparently trifling in character.

The usual symptoms of a laryngeal growth, when large enough to interfere with function, or when situated upon an important part of the structures, are: cough; alteration of voice; dyspnœa; dysphagia; and pain.

Cough is not a frequent symptom unless the growth be near the glottis, very large, or vascular and apt to bleed. The character of the cough may be dry and hacking, or moist and accompanied by expectoration varying in character and consistence. When vibration of the lips of the glottis is interfered with, the tone of the cough will be rough, hoarse, whispering, or aphonic. When the growth is large, the sound of the cough is often quite similar to that of the cough of croup.

Alteration of voice occurs only when the growth, by its seat or its size, interferes with the due vibration of the vocal cords. A growth upon the vocal cords, between them or beneath them, will produce a hoarseness of the voice even when the growth is very small; but a growth upon other portions of the larynx will not interfere seriously with the voice unless it extends permanently or at times within the chink of the glottis, or presses upon one or both vocal cords so as to impede their free vibration. Where a growth is so situated as only at times to interfere with the functions of the vocal cords, the hoarseness or dysphonia will be intermittent, and this intermittence may show itself more than once during the utterance of a single sentence.

A small growth upon the vocal cords may entangle a clump of mucus now and then, and thus give rise to a sudden hoarseness or aphonia, which ceases as suddenly, upon detachment of the mucus. According to the position of a small growth upon the vocal cords, especially in cases of symmetrical excrescences upon both cords, the alteration of the voice will be found to concern a certain portion of the musical scale, its pitch varying with the length of cord in vibration, in obedience to the laws of acoustics. In this way a double vocal sound is produced by a growth situated upon the anterior third of the cords, and thus dividing them into four vibrating reeds. Unless the growth is quite large, or protrudes within the chink of the glottis, actually preventing its closure, there will not be apt to be complete aphonia. Sometimes the voice is uneven, that is to say, hoarse, aphonic, and shrill, at irregular intervals during speech. Usually there is a characteristic dull timbre to the aphonic or dysphonic intonation, suggestive of mechanical obstruction, and differentiating it at once from hoarseness and dysphonia the result of other causes.

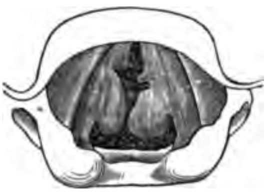
Dyspnœa is not present unless the growth is comparatively large, so as to offer obstruction to the ærial current, or unless the parts become swollen in consequence of intercurrent catarrhal inflammation. The dyspnœa will be irregularly intermittent unless the growth be very large. The dyspnœa will vary, with the case, from mere embarrassment of breathing, to distress of the severest character, threatening asphyxia. In many instances the dyspnœa can be relieved by change of position of the head, a symptom which is indicative of a movable tumor. Cases are on record in which growths of this kind have produced asphyxia. Two such cases, in which the patients were forewarned of the result by the author, occurred in individuals, with tumors within the glottis, who declined surgical interference.

The tumors were not very large in either instance, as will be seen by reference to the accompanying illustrations, Figs. 71 and 72; but they were in dangerous locations, and seriously compromised the integrity of the glottis.

As these cases are particularly instructive, they are placed on record.

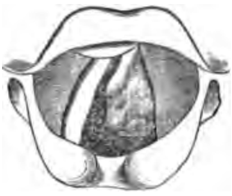
A. S——, aged 40, a brewer, was brought to me November 9th, 1868, by Dr. Bloom, of Philadelphia, to be examined as to the cause of a chronic hoarseness which had existed for upwards of twenty-five years. The patient had chronic follicular pharyngitis, with congestion of the larynx. The vocal cords were thickened and very red in color, and upon each of them was an irregular flabby growth also very red in color. As the patient was suffering from a little sore throat at the time, it was impossible to determine whether the color of the growths was simply due to temporary injection of their mucous covering, or whether this was their ordinary aspect. The appearance is depicted in Fig. 71. An operation for removal of these growths was urged upon the patient, to which he consented; and making an appointment for a subsequent interview, he left my house. I never saw him again. Some months afterwards, Dr. Bloom informed me that the patient had been dissuaded by his wife from undergoing the operation, and that he had died suddenly. The patient attributed his disease to syphilis contracted when very young.

Fig. 71.



Tumors on both vocal cords, producing sudden death.

Fig. 72.



Tumor on left vocal cord, producing sudden death.

Wm. McN——, æt. 56, a shoemaker, was sent to me March 1st, 1869, by Dr. Shapleigh, of Philadephia, who examined him with me at a second interview on the following day. A red irregular tumor was found upon the left vocal cord. Its appearance is shown in Fig. 72. Dysphonia, with paroxysms of distressing dyspnœa, had existed for about a year. The patient had contracted syphilis years before, but was otherwise in general good health. An operation was urged upon this patient also, and an appointment was made for tentative procedure, which appointment was never kept. A few weeks later I was informed by Dr. Shapleigh that he had been told by the friends of this patient that he had sought relief elsewhere, and was placed under treatment for syphilitic laryngitis, part of which consisted in cauterizing the larynx with the ordinary sponge-probang; and that having died suddenly, a post-mortem examination had been made, revealing the presence of the tumor, to the existence of which the death had been attributed.

These were cases of sudden death, and, in the absence of a laryngoscopic examination, would in all probability have been pronounced by a coroner's jury as due to a "visitation of God." Doubtless many cases of sudden death attributed to a visitation of Providence have been due to suffocation by a laryngeal tumor, the existence of which has not been suspected. Examinations of the larynx in cases of sudden death would throw light on this point.

In contrast to these cases, many others are on record of much larger growths, implicating the glottis to a much more serious extent in appearance, and also in reality, and in which there were no severe symptoms of dyspnœa threatening suffocation.

Dysphagia, or difficulty of swallowing, is not apt to be present unless the tumor is very large so as to encroach upon the cavity of the pharynx, or unless the tumor occupies the epiglottis or some portion of the region of the arytenoid cartilages, or the cartilages of Santorini.

Pain of an acute character is unusual in growths in the larynx, and when present is usually due to some other cause. More or less sense of annoyance, however, is not infrequent, with sometimes a sensation as of the presence of something which ought not to be there, and a consequent disposition to eject the foreign matter by expectoration. Occasionally, however, severe paroxysms of pain actually occur.

In addition to these symptoms, we occasionally find some alteration in the external configuration of the larynx; and not infrequently, when the tumor is large and of soft consistence, portions are spontaneously detached, or broken off during paroxysms of cough, and expectorated.

Mackenzie refers the formation of growths in the larynx to hyperæmia, and to catarrh as the most frequent cause of the hyperæmia.[1] He states that "neither syphilis nor phthisis, nor any other constitutional condition appears to favor the growth of these neoplasms." . . . . . . "Indeed, both the diathetic conditions referred to, appear to exercise a decidedly antagonistic influence to the development of new formations."

My own experience differs very markedly from that of the author quoted. Leaving out of consideration, as he does, those "imperfect papillary growths" which "occasionally appear on the posterior wall of the larynx, and on the mucous membrane covering the vocal cords and the inner surface of the arytenoid cartilages" "in the latter stages of laryngeal phthisis;" and although I do not find with him that "this is the exception," but rather a frequent occurrence, I have met with a large proportion of cases in which distinctly formed growths, of circumscribed outline, and often of tolerably large size, existed in cases of phthisis at a very early stage, as well as in cases where the ravages of the disease were readily detected on physical examination of the chest; and in some of these cases which have terminated fatally, and in others which are steadily progressing towards a fatal termination, the danger of impending suffocation has been averted, and the voice improved or restored by intralaryngeal operations, arousing vain hopes in the patient of complete cure in prospect.

Dr. Mackenzie remarks "when a very protracted syphilitic congestion occurs, growths may arise, but this is a rare exception;" and he quotes Dr. Harlan (*Am. Jour. Med. Sci.*, vol. lii. p. 122) as having well pointed out that "few laryngeal growths can be attributed to syphilis." It is undoubtedly true that but few cases of syphilitic congestion of the larynx give rise to the formation of growths; but we fear that both Dr. Harlan and Dr. Mackenzie are mistaken in their inference that few laryngeal growths can be attributed to syphilis. In a subjoined table of sixty-six cases occurring consecutively in the writer's private practice during the last five years, eight cases were distinctly traced to syphilitic congestion of the laryngeal structures, and twenty-two cases occurred in patients with phthisis. It is but justice to Dr. Mackenzie to quote that he admits that "of course laryngeal growths may occur in syphilitic persons as they do in the healthy, but syphilis does not appear to be a factor in their production." Syphilis is a disease of such vast extent, of such remorseless influence upon physiological and pathological conditions generally, that it is not improper to refer all cases of growth in syphilitic individuals to that cause wherever there is anything like a clear history; whenever there is other evidence of syphilitic disease; and to suspect a syphilitic origin whenever there is no other assignable cause, in a patient who has already suffered from syphilitic poisoning, especially if his remoter symptoms have been observable in his throat.

---

[1] **Essay on Growths in the Larynx. London, 1871. An elegant and classical work, worthy of close study.**

It is extremely difficult to trace the origin of these formations. Patients usually attribute them to "colds." They appear to take their departure, whatever be the predisposing cause, from catarrhs; syphilitic and tuberculous sore throat; erysipelas; the exanthemata, particularly measles; exudative inflammation of the larynx, whether croupal or diphtheritic; whooping-cough; and the inhalation of irritating substances, whether in solid or gaseous form.

Growths in the larynx appear at all ages. Some are congenital, and others make their appearance in advanced life. My own experience includes cases apparently congenital, and one occurring at upwards of 80 years. They occur of course in both sexes, but most frequently in the male. The periods of life at which they have been observed most frequently vary perhaps between 25 and 45 years of age.

Tumors of all kinds have been observed in the larynx, the most frequent variety being papillomata. In Dr. Mackenzie's tabulated list of one hundred cases of benign laryngeal growths subjected to treatment, sixty-seven were judged to be of this character. Of sixty-six cases of growth of all kinds, benign and malignant, in my own list, forty-eight were supposed to be papillomata. The results of the observations of other authors do not differ materially from those of Dr. Mackenzie.

The papillomatous growths are frequently multiple. The other formations are usually single. Fibroid tumors, simple and recurrent; mucous or cystic tumors, fatty tumors, glandular tumors, vascular tumors, epithelial and cancerous tumors have been found in the larynx by different observers; and in some instances the growths have exhibited unmistakable evidences of being compound, or composed of more than a single form of tissue.

The papillomatous growths, occurring in cases of phthisis, are apt to recur, but this does not appear to be the case when there is no constitutional disease. The malignant growths, as a matter of course, are exceedingly apt to recur. The most remarkable instance of this kind, of which I have any knowledge, is the following:

A. E., merchant, aged fifty-six years, a resident of New York, applied to me, January 15th, 1871, at the office of Dr. Elsberg (to see whose patients, I made periodical visits to New York during his absence in Europe), on account of a laryngeal trouble, of long standing, which was giving him some recent annoyance. He stated that some four months previously, Prof. von Bruns, of Tübingen, had removed a large polyp from his larynx by means of the écraseur, tracheotomy having been performed previously. On examination I found a large polyp, the size of half a cherry, lying upon the vocal cords anteriorly, and attached on the left side. Two very small growths were seen to the left of this and below. The patient was very much concerned when I told him of the presence of the growth, and still more so when I advised him to have it removed at once by operation externally. He was very anxious to have it removed by the écraseur, the same way as had been done by Prof. von Bruns, but this was represented to him as insufficient, on account of the great liability to further recurrence; and the external operation was urged upon him as the best means of saving his life. I made one attempt to seize the growth with forceps, but was unsuccessful, and did not press the matter further, inasmuch as it was thought best not to interfere with it except for thorough removal. The patient left after making an appointment for another interview, but did not return to keep it.

Some months afterwards I found on Dr. Elsberg's table a pamphlet,[1] recently published by Dr. Ruppaner, of New York, in perusing which I learned the subsequent history of this case.

It appears that Mr. E. first consulted Dr. Ruppaner about a month after I saw him, at which time the growth filled "nearly the entire supra-glottic space of the large larynx of the patient." Dr. Ruppaner subsequently, on May 8th, removed the growth by thyrotomy, after the previous performance of laryngo-tracheotomy, and found that it weighed 113 grains, and was a fibro-sarcoma. The rapid growth of this tumor from the size of half a cherry on January 15th, to such a mass as nearly to fill the supra-glottic space by the 13th of February following, certainly renders it the most remarkable case of rapid laryngeal growth on record.

A very curious morbid growth of the larynx, occasionally met with, consists of a band of membrane stretching from one vocal cord to another. I have seen two instances of the kind, and both in females suffering with phthisis. One case was under my own care, and was seen in consultation by Dr. Elsberg of New York; the formation being of recent origin, and apparently subsequent to ulceration of the vocal cords. The other case occurred in the practice of Dr. Elsberg, and has been reported by him in the Transactions of the American Medical Association for 1870. Here the bridge was exceedingly large, and was supposed to have been congenital. It was divided by the knife with relief to insufficiency of respiration, so marked, that the patient, a stunted girl of some 16 or 17 years of age, acquired a normal stature in a few months. The voice became good, though shrill. During an illness of Dr. Elsberg I had occasion to perform a second operation. The anterior portion of the commissure shows marked disposition to reunite, and its division with the galvanocautery, or a plastic operation practised after division of the thyroid cartilage, may become necessary to overcome the difficulty.

The size of a growth in the larynx will vary from that of a small seed to that of a mass almost filling the laryngeal cavity, and projecting beyond its lateral borders.

---

[1] Contributions to Practical Laryngoscopy. Second Series. Illustrated.

Morbid growths may occupy any portion of the larynx, but their most frequent seat is upon the vocal cords, a curious circumstance as yet unaccounted for. When we reflect that these structures are in constant motion, we might suppose on the one hand that this would be antagonistic to the development of a growth ; or, on the other, that this very activity would keep up a vascular supply of materials for its development once the morbid action has become established. That the activity of the vocal cords is not antagonistic to the formation of morbid growths, is known by actual experience.

The subjoined table gives the nature and seat of sixty-six cases of morbid growths in the larynx that have come under the author's professional observation, in his own practice.

Thirty-one Cases without apparent Constitutional Disturbance.

9 cases of papillomata (3 multiple) on one vocal cord.
6 " " (2 ") on both " cords.
3 " " beneath " "
1 case " on both " " and both ventricular bands.
1 " " " " " " and posterior wall of larynx.
1 " " " " " " and one arytenoid cartilage.
1 " " in left ventricle.
2 cases " on left aryteno-epiglottic fold.
3 " " " epiglottis.
1 case " " " and left aryteno-epiglottic fold.
1 " of fibroid polyp (pedunculated) beneath one vocal cord.
2 cases of epithelioma upon both vocal cords.

Twenty-two Cases associated with Phthisis.

4 cases of papilloma (3 multiple) on one vocal cord.
3 " " (2 ") " both " cords.
1 case " " both ventricular bands, and posterior wall.
1 " " " posterior wall of larynx.
1 " " " " " " and both ventricles.
1 " " " one ventricular band (left).
2 cases " " epiglottis.
1 case fibroma " one cord.
1 " epithelioma " " "
1 " " " both cords and both ventricles.
1 " " " epiglottis, one vent. band, one vocal cord.
1 " trachoma " both vocal cords.
2 cases of cystic (refilling in a few months) on both arytenoids.
2 " membranous bands on both cords, stretching from one to the other anteriorly.

Eight Cases associated with Syphilis.

4 cases of papilloma (1 multiple) on both vocal cords.
1 case " " one " cord.
1 " " " epiglottis, and both ventricular bands.
1 " " " " " " " and both vocal cords.
1 " spindle-celled sarcoma " both ventricles, both arytenoid cartilages, and posterior wall of cricoid.

Five Cases of Malignant Growths.

1 case of fibro-sarcoma on one vocal cord.
1 " encephaloid " epiglottis, and right ventricular band.
2 cases epithelioma " epiglottis.
1 case " filling entire larynx.

The microscopic examinations in the above cases, with the exception of a number which, being judged of as papillomata by external appearance, were not submitted to microscopic examination, were made by Dr. J. J. Woodward of Washington, and Drs. Da Costa, Pancoast, Jr., Tyson, Wm. Pepper, and Corbit

---

Note.—Since the above list has been in the hands of the printer the author has had five more cases; one, a cystic tumor of the lingual face of the epiglottis, in a lady in good health, but troubled with sore throat (attributed to chronic pharyngitis) for more than fifteen years; she declines interference for the present. The second case concerns a number of papillomata in a married lady, about forty years of age; the growths occupied the edges of the vocal cords and the posterior wall of the larynx, and produced great dyspnœa. They are attributed to syphilis, though no distinct history of this kind can be obtained. They were readily removed with the forceps, but show an unusual disposition to recur, a circumstance pointing to tuberculosis, perhaps, rather than syphilis. As yet, no malignant elements have been detected under the microscope. The third case is one of phthisis in its early stage, without marked auscultatory corroborative evidence, and is in the form of a fimbriated papillomatous mass upon the inner surface of one of the arytenoid cartilages, as usual the left one, and is attended with considerable inflammatory swelling of the cartilage, suggestive of perichondritis; the parts are so irritable that the growth cannot be grasped in the forceps, and systematic manipulations are paving the way for its removal, which is indicated on account of occasional paroxysms of dyspnœa. The fourth case is one of multiple tumors on posterior laryngeal wall, with complete aphonia. Phthisis suspected. The fifth, a whitish tumor, nature undetermined, in the substance of the left vocal cord, and on its inferior face. Phthisis suspected.

of Philadelphia, all of whom are acknowledged to be competent microscopists.

The diagnosis of growths in the larynx may, under certain favorable circumstances, be assisted by physical exploration with the end of the finger; but even when the growths are high up and very large, merely a vague notion can be thus obtained. The only method of arriving at a satisfactory diagnosis as to the existence of a tumor, its seat, mode of attachment, size, etc., is by laryngoscopic examination. The entire extent of growth cannot always be inspected in this way, but much valuable information on this point, as well as with reference to the consistence of the growth, its movability, and the feasibility of its removal through the mouth, may be obtained by examining it with a bent probe or laryngeal sound, applied with the aid of the laryngoscopic mirror. The accomplishment of this exploration is not accompanied by much difficulty, inasmuch as the parts have usually been already rendered somewhat tolerant of mechanical manipulation by the very presence of the tumor.

Treatment of Growths in the Larynx—There is no doubt of the fact, that some growths in the larynx are susceptible of spontaneous cure; but such a fortunate result occurs but seldom, and cannot be foretold beforehand.

Certain growths of syphilitic origin, arising in part, if not in whole, from the cicatrizing surface of ulcers, even when quite fleshy or sarcomatous in appearance, will gradually yield to internal treatment by iodide of potassium and bichloride of mercury; and in cases of this kind where the growths are not large, and do not interfere with the respiratory functions, it is well to give a fair opportunity to this treatment before resorting to operative procedures. Even in cases of comparatively large growths, compromising the function of respiration, it would not be inadvisable, if concomitant indications are favorable, to perform tracheotomy in order to overcome the dyspnœa, and to await the result of internal treatment before instituting local interference. Such cases should be watched most assiduously with the laryngoscopic mirror, as a matter of course, in order to study the progression or retrogression of the growths.

As a rule, however, an operative procedure is requisite in most cases of laryngeal growths, either for their removal by forceps or cutting instruments, or for their destruction by caustics or crushing instruments.

Where the growth is small, and does not interfere with the function of respiration, there is no necessity for surgical intervention, except in cases of interference with the voice in individuals who gain their livelihood by singing or speaking. In a private individual, to whom a moderate degree of hoarseness is of no account, a small growth need not be subjected to treatment unless repeated laryngoscopic examinations show that it is increasing in size. Under these circumstances there can be no doubt as to the propriety of its removal. Cases are on record where small growths have remained stationary for long numbers of years. I have examined the larynx of a lady from time to time, in whom a small growth on one of the vocal cords has remained unchanged for at least ten years, presenting the same appearance as first seen when originally examined by Dr. Elsberg, of New York, as to the cause of a hoarseness of voice which had then existed for some sixteen years. It is the case depicted in Fig. 26, in his prize essay.[1] On one occasion, recently, after catching cold, the little nodule on the right vocal cord had acquired a tapering end, which, in phonation, struck the opposite cord, and produced increased hoarseness, and a troublesome sensation in the parts; but shortly afterwards the parts resumed their ordinary appearance.

A case will be narrated, in the sequel, in which an elderly gentleman had probably had a growth since childhood, and which, becoming enlarged so as to produce distressing hoarseness, was destroyed by a single application of the acid nitrate of mercury.

The operations performed for the removal of growths within the larynx consist in cauterization; crushing with the forceps; extraction by the forceps, or by the wire loop, or a small chain ecraseur; scarification and cauterization; excision with the knife, scissors, or the galvano-cautery; and removal after section of the thyroid cartilage.

---

[1] **Laryngoscopal Surgery illustrated in the Treatment of Morbid Growths within the Larynx. Prize Essay of the American Medical Association for 1865**

Removal after sub-hyoidean laryngotomy, has been performed by Dr. Pratt,[1] in 1859, and subsequently, in 1863, by Dr. Follin,[2] but it is not likely that this operation will ever now become legitimized in surgery, because, as Dr. Mackenzie remarks, the cases most suitable for it are just those which can be most readily reached through the mouth by laryngoscopic treatment.

Small condylomatous tumors, papillomata as they are called, and which are frequently multiple, may often be destroyed by repeated applications of caustics, such as nitrate of silver, chloride of zinc, chromic acid, nitric acid, acid nitrate of mercury, Vienna paste, etc. Growths, even of considerable size, are sometimes amenable to this treatment, though, as a rule, it is better under such circumstances to remove as much as possible with the forceps, and then to cauterize the remnant of the growth.

For the purpose of conveying the caustic material to the parts, various instruments have been devised; most of them shielded so as to prevent contact of the substance with the sound tissues. To enter into a description of all the instruments which have been constructed for this purpose, and for other purposes of laryngeal surgery, and to discuss their merits, would be a task as thankless as it is unnecessary. All that will be attempted in these pages will be to describe those instruments which are really valuable, and which have withstood the test of experience; and this remark refers to the whole subject of laryngeal surgery as well as to that under immediate discussion.

In order to be effective, the caustic must be used in concentrated solution or in substance, and must be kept in contact with the morbid structure for some seconds, as a mere momentary touching will prove ineffective. The parts are treated in this manner every day, or every other day, or less frequently according to circumstances; and these must be judged of in individual cases, according to results. As a rule, the first contact of a caustic solution with any portion of the larynx induces a distressing spasm, which becomes less and less as the parts become accustomed to the interference. It is well, therefore, to test the sensibility of the parts beforehand by the employment of moderate measures before resorting to severe ones. Prof. Stromeyer tells us that several patients have lost their lives in the surgeon's office by incautious cauterization of the larynx.

---

[1] *Gazette des Hôpitaux*, 1859, No. 103, p. 409. Elsberg's Prize Essay, p. 15.

[2] Mackenzie on Laryngeal Growths, p. 99, from *Arch. Gén. de Méd.*, Feb., 1867.

Operations of this kind, therefore, and in fact all intra-laryngeal operations, should not be undertaken until the surgeon has, by repeated practise in minor cases of laryngeal disease, acquired the skill to carry his instrument safely to the desired point. Fortunately, sound tissues bear the contact of the ordinary caustics very well, and but little injury ensues if they are cauterized instead of the growth; but this does not affect the growth which has not been reached.

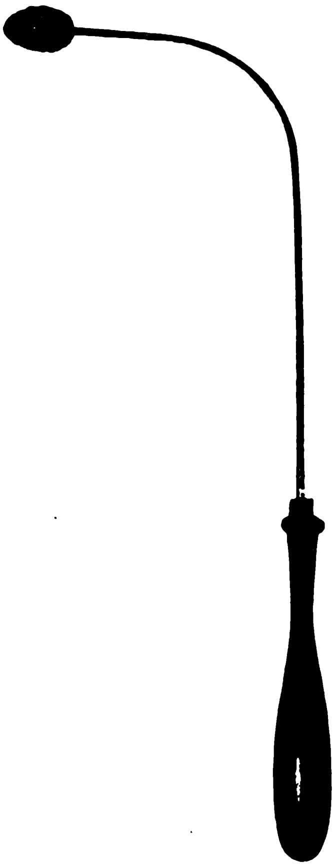
As a rule, the morbid growth itself is much less sensitive than the sound portions of the larynx, and therefore if the patient is steady and the operator skilled, there is less danger of inducing suffocative paroxysms than might otherwise be supposed.

In my own hands this treatment is reserved for very small growths which I cannot get hold of with the forceps or other instrument for removal or extraction, and for exciting destructive action in the remnants of larger growths, as much of which as possible has already been removed by some of the methods to be described later.

Concentrated solutions of caustic materials are best applied by means of small pieces of sponge securely fastened to slender but strong and rigid wires, or firmly held between the teeth of delicate forceps. The following illustrations will serve to give a better idea of these instruments than an elaborate description.

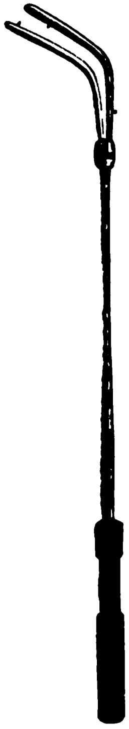
The fused nitrate of silver in stick may be applied by means of special caustic-holders, of which many forms have been contrived by Lewin, Fauvel, Bruns, Elsberg, and others, or by means of the forceps-holder of Tobold, depicted in Fig. 76. But all instruments of this kind are clumsy, and conceal the essential point of the instrument from view. A much better method is that of dipping a roughened platinum bulb into melted caustic, after first heating the bulb, which will enable it to take up sufficient of the material and to hold on to it for many hours. Tobold's probe is depicted in Fig. 77, and answers an admirable purpose when the growth is small. Dr. Mackenzie prefers an aluminium wire for this purpose, and Prof. Stromeyer recommends a metallic sound with a glass bulb soldered on it, the bulb to be immersed in a concentrated solution of nitrate of silver, which is then allowed to dry upon it.

Fig. 73



Tobold's Sponge-holder (after Tobold).

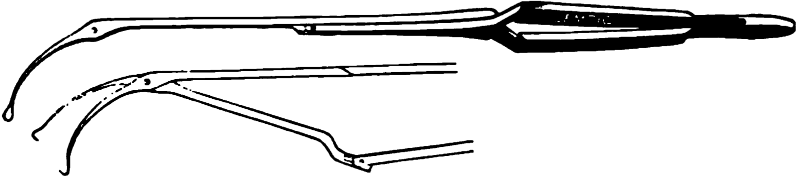
Fig. 74.



Sponge-holder.

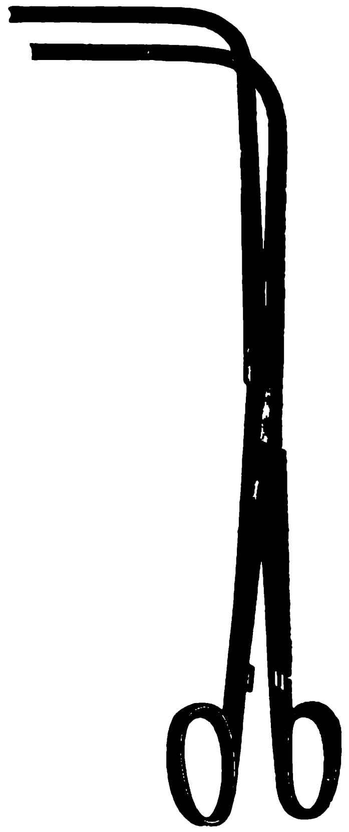
Prof. Tobold has also devised a concealed socket, movable in any direction, in which the molten nitrate of silver, or chromic

Fig. 75.



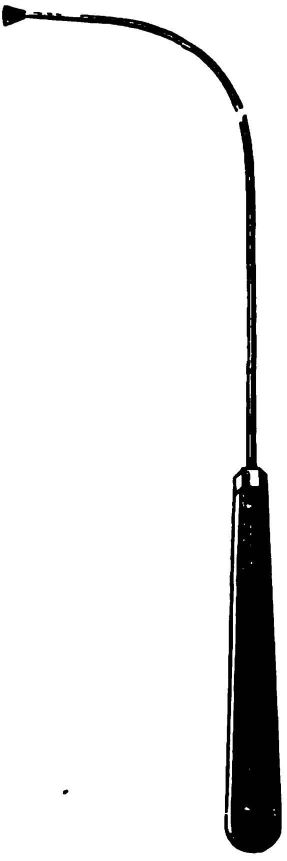
Elsberg's Sponge-holder.

Fig. 76.



Tobold's Forceps for nitrate of silver in stick (Tobold).

Fig. 77.

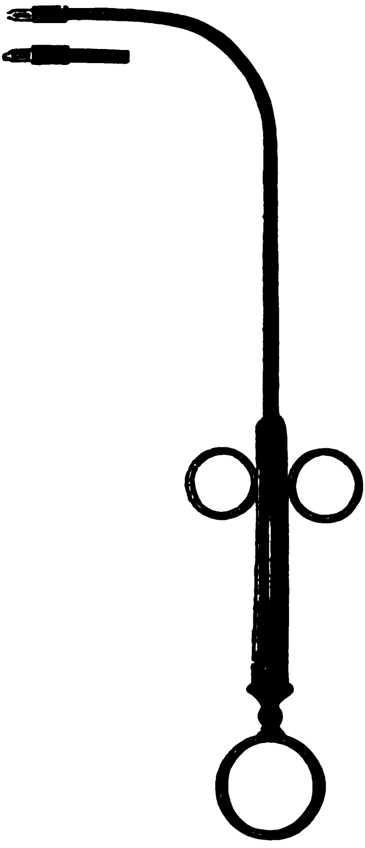


Tobold's Roughened Probe, for the use of molten nitrate of silver (Tobold).

acid crystals, if preferred, can be inserted, and which is pushed forward at the desired moment to expose the caustic. It is depicted in Fig. 78.

The escharotic employed most frequently by Dr. Mackenzie, of London, is the London paste, already mentioned in connection with that gentleman's method of treating enlarged tonsils.

Fig. 78.

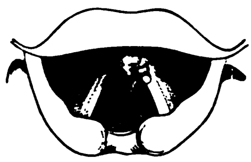


Tobold's Concealed Holder, for molten nitrate of silver, or for chromic acid (Tobold).

The following illustrations, Figs. 79 and 80, will represent the sort of growths treated by the author with caustics.

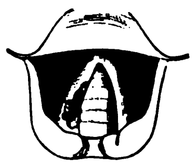
Fig. 79 represents the appearance of a growth upon the left vocal cord of a gentleman aged about sixty years, who had been hoarse from childhood; but in whom the hoarseness had increased very much during four or five months previous to his application to me for relief. I found a small warty excrescence occupying the anterior portion of the left vocal cord, and in such a position as to interfere seriously with vocalization. The voice was always hoarse, but would become suddenly aphonic in the midst of a sentence, and then after a clearing of the throat by cough, revert to its former hoarseness. The annoyance of this inconvenience, the existence of a harassing cough, and the dread of some fearful result, rendered the patient anxious for relief. I attempted to remove the growth with the forceps; but during repeated efforts only succeeded in detaching an insignificant portion of it. Finding no beneficial result from nitrate of silver, and being unwilling to open the larynx for the removal of a growth which was not interfering with respiration, I finally concluded, by the advice of a professional friend called in consultation, to attempt its destruction by the strong acid nitrate of mercury. Inasmuch as the patient had borne repeated applications of the molten nitrate of silver with little inconvenience, I had no hesitation in resorting to the agent mentioned. No difficulty was experienced in touching the spot; but there ensued the most violent spasm of suffocation that it has ever been my lot to witness from the application of a caustic solution within the larynx. For a moment I thought I had before me one of those unfortunate cases alluded to by Prof. Stromeyer, and actually had my hand upon my penknife with a view of plunging it into the trachea, should the spasm continue a few moments longer, when the paroxysm ceased, to my unutterable relief. After one or two less violent paroxysms the immediate danger was over, and I mentally resolved that I would not use the acid nitrate of mercury again under similar circum-

Fig. 79.



Excrescence on left vocal cord.

Fig. 80.

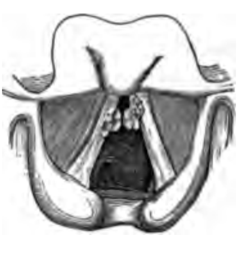


Excrescence on right vocal cord.

stances. The patient's voice was aphonic for several days, during which there was a violent inflammation of the larynx, paroxysms of asthmatic dyspnœa, and more or less painful deglutition. Rest, purging, liquid diet, and the frequent inhalation of steam impregnated with narcotics, constituted the treatment for this condition. The tumor sloughed off, and the patient's voice became better than it had been for years. After his recovery the patient told me that I should not make another such application, even if it should be the only method of saving his life. He has had no return of his former trouble.

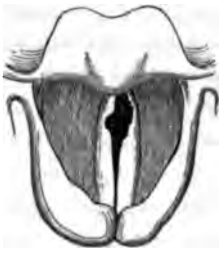
Fig. 80 represents the larynx of a lady, thirty-two years of age, sent to me by Prof. Flagg, on account of a persistent hoarseness, of some five or six months' duration. There was no cough, expectoration, pain, or dyspnœa; but the patient complained of an occasional sensation of something in the throat which she would like to get rid of. On laryngoscopic examination, a small gelatinous-looking mass was seen upon the right vocal cord, which, on probing, proved to be a morbid growth. It was repeatedly cauterized with the solid nitrate of silver, two or three times a week, and in less than a month was completely removed by the treatment, the voice having recovered its original clearness.

Fig. 81.



Epithelial growths on both vocal cords, in a case of phthisis.

Fig. 82.



Appearance of cords after destruction of growths with chromic acid.

These two cases are selected, the one to show that the element of danger in severe applications is not always removed by tolerance to measures less severe; and the other to show how readily a soft growth of recent occurrence sometimes yields to the nitrate of silver. Figs. 81 and 82 represent the appearances of the larynx before treatment in a case of epithelial growths, and after their destruction by chromic acid. These occurred in a case of phthisis.

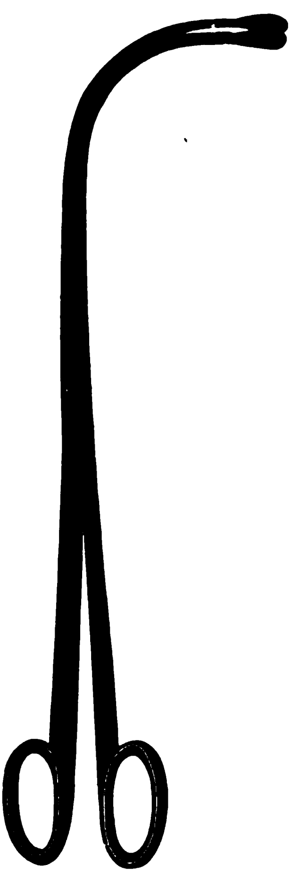
The treatment by the nitrate of silver is very protracted as a rule. In one of my cases, a lady sent me by Dr. Hall of Philadelphia, there was complete aphonia of more than a year's duration. Several minute growths occupied both vocal cords. I found it impossible to grasp them in the forceps, and resorted to nitrate of silver. Applications were made every two or three days for several months, with occasional intervals of a week or two to see if the growths would recede without further treatment; and at the end of some five or six months, the cords were clear, and the voice, which had improved from the very first, sufficiently sonorous for all practical purposes, but not clear enough for purposes of singing. Several years have elapsed and the voice continues good.

In another case the subject was a prominent female vocalist, who applied to me in the winter of 1867 on account of a difficulty in singing and occasional hoarseness, and in whom I was able to watch the formation of the growth as well as its gradual retrocession. Laryngoscopic examination showed a want of power in the muscles of the left vocal cord. As soon as the lady would exert her voice, the cord bent in the middle so as to destroy the elliptical figure of the opening of the glottis in phonation. I told her she must give up singing, and rest the parts. This she could not do, being under engagement, but she promised to follow my advice in other matters, and to obey me in all as soon as her engagement was concluded. She visited me every day, and I employed local electrization by the induced current, with the negative pole applied to the cord by means of Mackenzie's laryngeal electrode, the positive pole being placed in front of the crico-thyroid membrane by means of a sponge. This treatment improved the voice for the time. In a few weeks the patient's duties required her presence in another city, and local treatment was intermitted. She continued, however, to pay great attention to her general secretions, and to take three times a day ten drops of the compound tincture of ignatia amara, which had been previously ordered for her.

Towards the end of the winter she returned to Philadelphia, the voice much worse than it had been before she left. I now noticed that the bend of the cord had become permanent, and that the knuckle thus formed struck the opposite cord every time she attempted to run the scale, and that at this point it was eroded or scratched. The treatment by electricity was renewed without essential benefit, though there seemed tobe some improvement; but the eroded appearance upon the distorted cord became gradually converted into that of a knob, which finally developed itself into a nodule the size of the head of a large pin. With this I should not have felt inclined to interfere at the time, had it not been that my patient was a professional vocalist dependent upon her voice for her livelihood, and anxious to have her vocal powers restored at any personal sacrifice, rather than have to support herself by instrumental music, in which she was also a proficient. To seize so small a growth with a pair of forceps was out of the question. Several unsuccessful attempts were made to pierce its base with Tobold's lancet knife, and so detach it from the cord. Finally it was determined to persist in the local contact of the molten nitrate of silver conveyed upon a very delicate roughened bulb of platinum. The treatment was extremely protracted. Many times the tumor was missed and the cord cauterized; but these persistent efforts were crowned with success, and finally, after the patient had been under my care for two years, with summer intermissions, all trace of disease was removed, and after a few months' practice to regain lost ground, the lady was able to sing with much finer effect than she had ever been able to accomplish before. Her voice has remained perfect ever since.

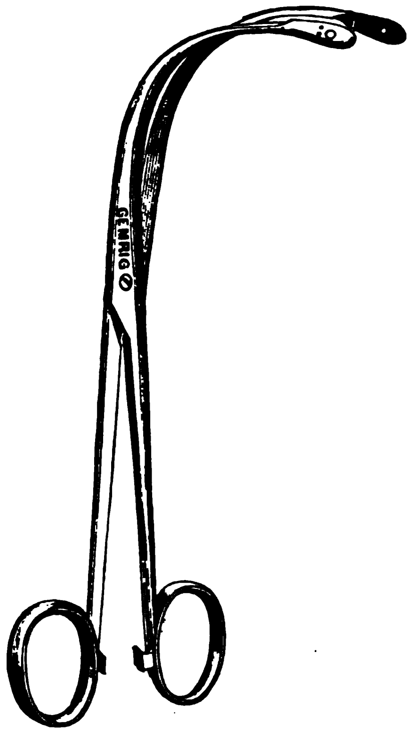
The majority of laryngeal growths are suitable for removal by evulsion with forceps. Instruments for this purpose must be slender and strong, and well curved. In order to meet the various indications presenting themselves, several pairs of forceps are required, of different lengths, and with jaws opening in different directions. The ordinary form of laryngeal forceps is represented in Figs. 83 and 84. The jaws are provided with teeth, or with serrations, or both, which hold on to the growth when it is once grasped, so that it is either removed in mass, or in little bits, such as are gouged out by the jaws of the forceps. The forceps of Fauvel, Fig. 84, is provided with a retaining catch on the rings, which prevents the jaws of the forceps from reopening, once they have grasped the growth.

Fig. 83.



Tobold's forceps (after Tobold).

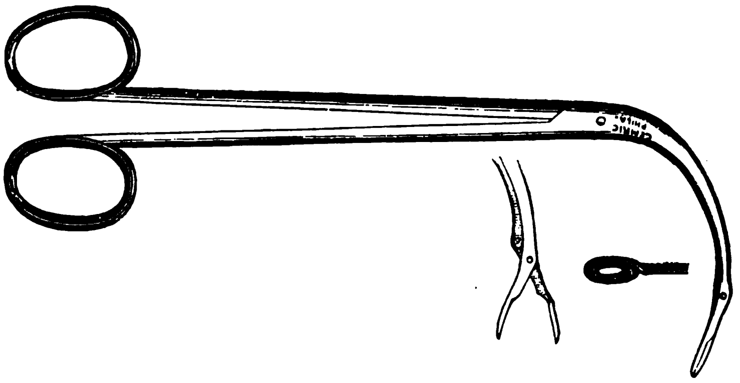
Fig. 84.



Fauvel's forceps.

A very admirable pair of forceps in which the jaws open only at their extremity and thus do not cut off a view of themselves in the laryngoscopic mirror, has been devised by Dr. Cuzco, and is represented in Fig. 85. These I have found very efficient, and very strong; and have had them constructed so that the movable jaw opens anteriorly, posteriorly, or to either side, in order to facilitate the removal of growths situated in different localities of the larynx.

Fig. 85.

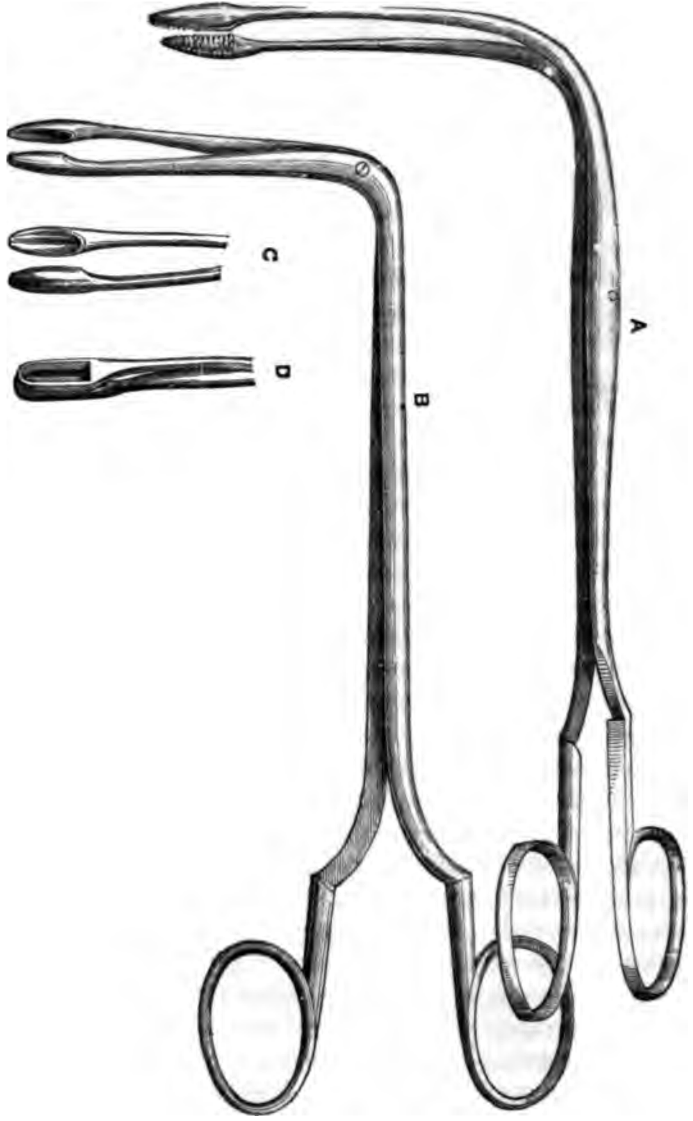


Cusco's forceps.

Dr. Mackenzie of London has improved the laryngeal forceps by altering the curve and rendering it more abrupt. With these instruments, contact with the epiglottis is, in many cases, more easily avoided than with instruments with the catheter-like curve. Still the latter are as yet in more common use, and have done good service. I have used these forceps of Mackenzie, recently, with great satisfaction. They are depicted in Fig. 86, and I am indebted to the inventor for the illustration.

A peculiar form of forceps, termed tube-forceps by Mackenzie, were early constructed by laryngoscopic operators. The design was to secure a slender instrument with jaws at its extremity, which jaws could be opened or closed at will by means of a spring in the handle and controlled by the operating hand. These were constructed so that the blades of the forceps portion could present in any desired direction. The German laryngoscopists in particular have been very prolific in devices of this kind. These instruments are not very serviceable except in the case of small growths; and they are exceedingly liable to get out of order. The delicacy of their mechanism is incom-

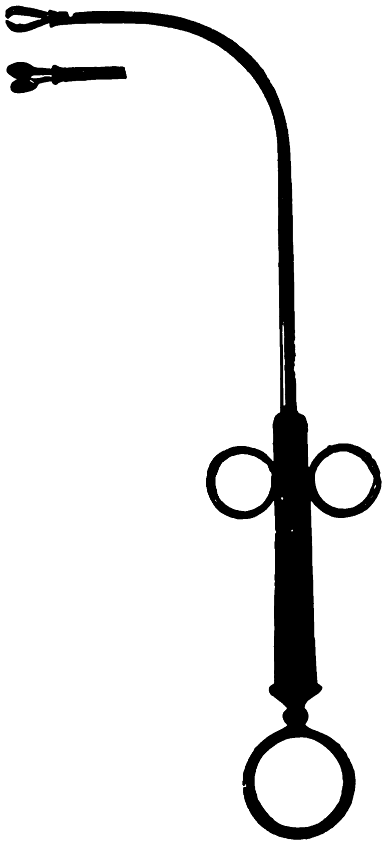
Fig. 86.



Mackenzie's laryngeal forceps (Mackenzie).
A. Lateral forceps. B. Antero-posterior forceps. C. Cutting forceps.
D. Forceps, of which one blade cuts, while the other presents a flat surface.

patible with a sufficient degree of strength for most purposes. Still, in cases of soft growths, especially in the immediate vicinity of the glottis, and beneath it, they can be employed on account of their slenderness, when the larger instruments cannot be used. A very simple form of forceps of this kind, the blades of which are protruded by pressure of the thumb down upon a rod in the barrel of the handle, as devised by Tobold, is depicted in Fig. 87.

Fig. 87.



Tobold's concealed pincette (Tobold).

The more complicated tube-forceps of Semeleder, Stoerk, Lewin, and others, are not as effective as the tube-forceps

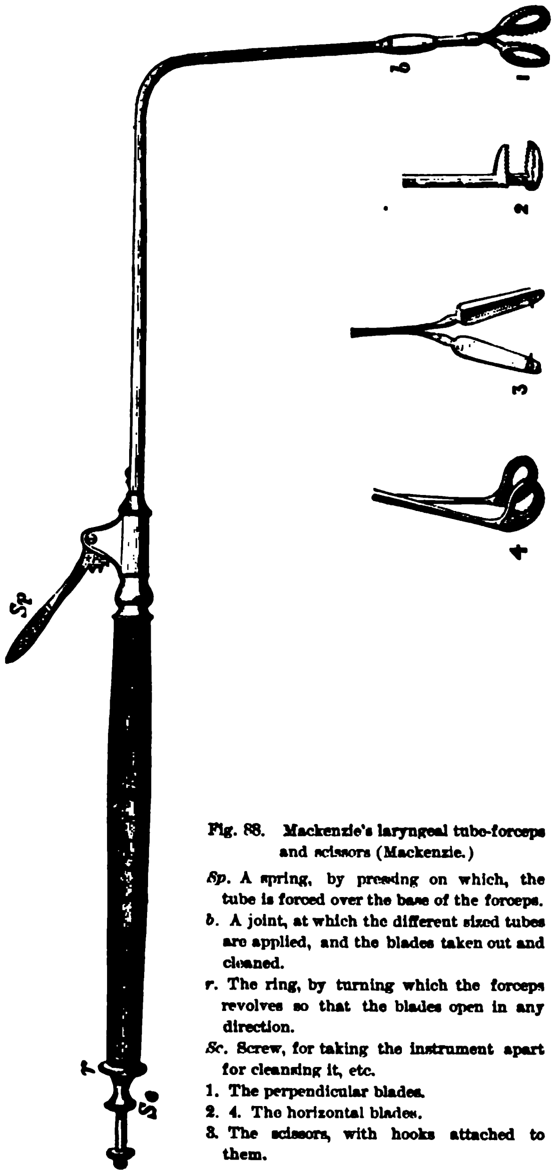


Fig. 88. Mackenzie's laryngeal tube-forceps and scissors (Mackenzie.)

Sp. A spring, by pressing on which, the tube is forced over the base of the forceps.

b. A joint, at which the different sized tubes are applied, and the blades taken out and cleaned.

r. The ring, by turning which the forceps revolves so that the blades open in any direction.

Sc. Screw, for taking the instrument apart for cleansing it, etc.

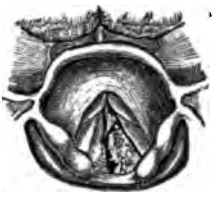
1. The perpendicular blades.
2. 4. The horizontal blades.
3. The scissors, with hooks attached to them.

devised by Dr. Mackenzie, and used with great success by him for a number of years. He has laid me under obligations for an illustration of these forceps which are depicted in Fig. 88.

Fig. 89 represents the larynx of a young man, the subject of phthisis, with several papillary growths above and below the vocal cords. There was great dyspnœa and hoarseness. The growths were in the main removed with Mackenzie's tube forceps, with relief to the dyspnœa and improvement in the voice.

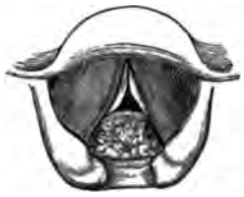
Fig. 90 represents the larynx of a married lady who had suffered for four years with hoarseness which gradually increased to aphonia; and, for a year or so, with dyspnœa. The ventricular bands were very thick and hypertrophied, the true cords were barely seen, and a papillomatous tumor of the size of a small cherry, or a very large pea, occupied the posterior wall of the larynx below the inter-arytenoidal fold. The growth was removed by evulsion with Mackenzie's antero-posterior forceps, with prompt relief to the dyspnœa, and gradual restoration of voice.

Fig. 89.



Papillary growths in phthisis. Removed with forceps.

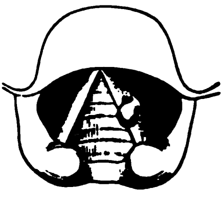
Fig. 90.



Papilloma occupying posterior laryngeal wall, and removed by evulsion.

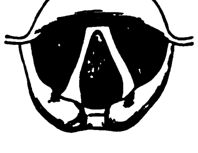
When a growth is pedunculated, it can be very readily removed by a tug with the forceps, very little force being required, as a rule, for this purpose. Figs. 91 and 92 represent growths of this character. That depicted in Fig. 91 represents a pedunculated growth on the left vocal cord of a gentleman in the last

Fig. 91.



Pedunculated polyp on vocal cord, in a case of phthisis.

Fig. 92.



Pedunculated fibroid polyp beneath vocal cords, and removed with Fauvel's forceps.

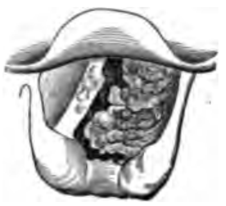
stage of phthisis pulmonalis, and brother of a physician practising in Philadelphia. The condition of the patient rendered an operative procedure superfluous, as it could have had no influence on the pulmonary disease, which steadily progressed to an unfavorable issue. The only symptom attributable to the growth, in this instance, was a moderate degree of hoarseness.

Fig. 92 represents the laryngoscopic appearance of a fibroid polyp, which I removed with the forceps of Fauvel from beneath the left vocal cord of a lady of Philadelphia. A detailed account of the case has been published elsewhere.[1]

Where the growths are large, it is only very seldom that they can be removed in mass. As a rule, small pieces are torn off, from time to time, so that a number of operations are necessary before the larynx can be cleared.

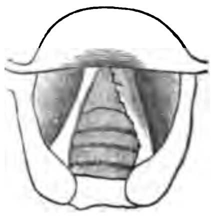
Figs. 93 and 94 will represent a case of this kind, which was referred to me by Prof. Stillé, of Philadelphia, June 3, 1870. On introducing the laryngoscopic mirror, I saw a large papillomatous growth, the size of a filbert, upon the left side of the larynx, and a small growth of the same nature upon the right vocal cord. Introducing the laryngeal forceps of Cuzco, I removed quite a large piece of the main growth at the very first attempt, and sent it to Prof. Stillé for microscopic examination. It was handed to Prof. Tyson, microscopist to the Philadelphia Hospital, who pronounced it a simple epithelial formation.

Fig. 93.



Laryngeal growths removed by evulsion and caustics.

Fig. 94.



Same case as Fig. 93, after removal of growths.

On the following day Dr. Stillé examined the patient with me, confirming my diagnosis, and approving of the treatment.

---

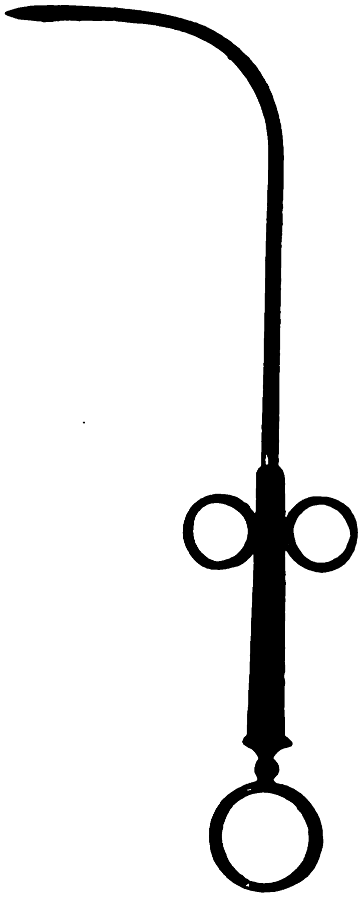
[1] *Am. Jour. Med. Sci.*, April and October, 1867.

The patient visited me from day to day with frequent intervals, and I gradually cleared the larynx by the method of evulsion, until finally, at the end of three weeks, it presented the appearance shown in Fig. 94. During the course of treatment it was found that the large growth was multiple, growing from the vocal cord as well as from the ventricle and ventricular band. The amount of tissue removed was much greater than the mass of a filbert.

The remnants of the growth were cauterized with concentrated carbolic acid; and when the patient, a married lady about twenty-six years of age, left for her home in the centre of the State, her voice, which was completely aphonic at the time I first saw her, and which had been very hoarse for about a year and a half, was in excellent condition. She was recommended to continue for some time daily inhalations of a weak solution of carbolic acid. A few months later I received a letter from her physician, informing me that her voice had continued to improve in strength and clearness, and that it was at that time in all respects satisfactory, and could be heard at a considerable distance down the road, and that, at the time of writing, there was no evidence of growths having been in the larynx. Within a few weeks I unexpectedly received a grateful letter from the patient's husband, informing me that all evidence of the tumor (as confirmed by a laryngoscopic examination made by her physician) had long disappeared, and that, save a slight huskiness, her voice is as good as ever; and that she had not used her inhalations for over a year.

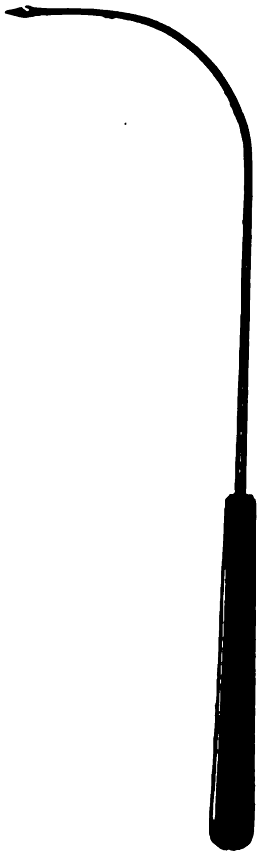
Excision with knife or scissors is sometimes practised for the removal of growths from the larynx. The use of the knife is also necessary, occasionally, to detach a portion of a growth at its base, in order the better to adapt it for removal with the forceps. Besides this, a minute growth on the edge of one of the vocal cords which cannot be seized in the forceps, may sometimes be detached by piercing its base with a small lance-shaped knife, which, as it is pushed onward, severs the growth from the cord. The danger of dropping the tumor in the trachea has caused some objection to this operation. The chances are greater that it would be coughed out; but if not coughed out at once, it would doubtless be discharged subsequently in the expectoration. It is hardly likely that a nodule the size of a large pin would be inhaled into one of the smaller bronchi; and if this were to happen, it is likely that the irritation it would produce would lead to its expectoration in the products of secretion.

Fig. 95.



Tobold's concealed knife (Tobold).

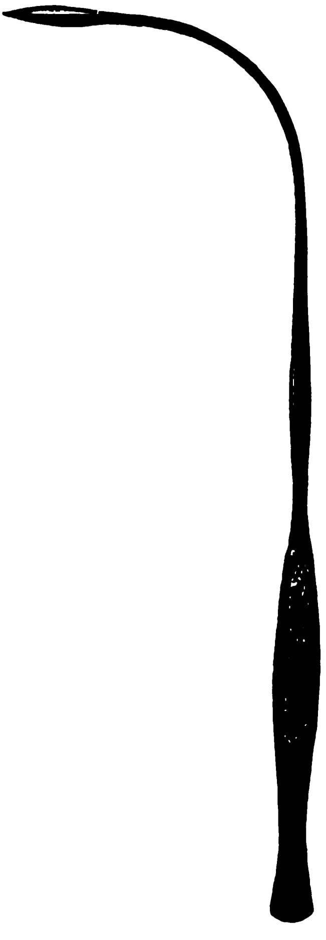
Fig. 96.



Tobold's lancet-pointed probe (after Tobold).

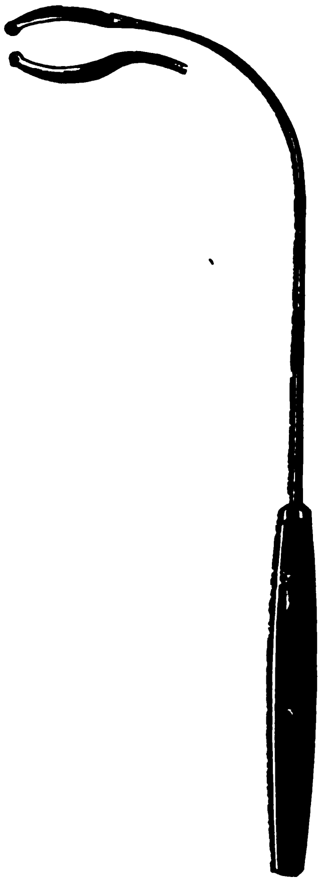
The knife is also required for the division of membranous bands, stretching from one vocal cord to the other, and also for the division of the commissure which often unites the anterior portion of the vocal cords after removal of growths from them by external incision; the operation being requisite not so much for relief of dyspnœa, but rather to improve the character of the voice, which is shrill, in consequence of the shortened size of the vibrating reeds, thus raising its pitch.

Fig. 97.



Tobold's knife, with double cutting edge (after Tobold).

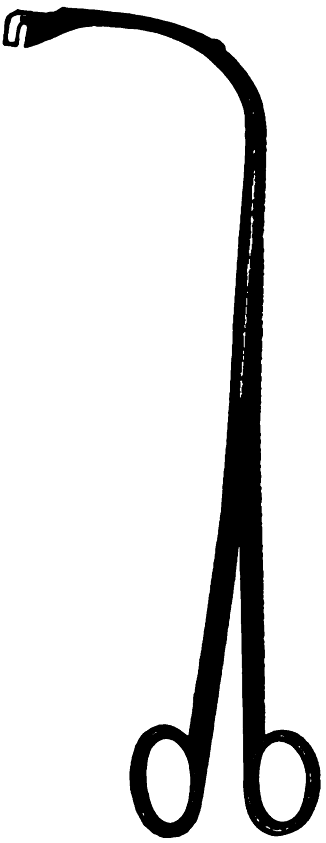
Fig. 98.



Tobold's knife, with single cutting edge (after Tobold).

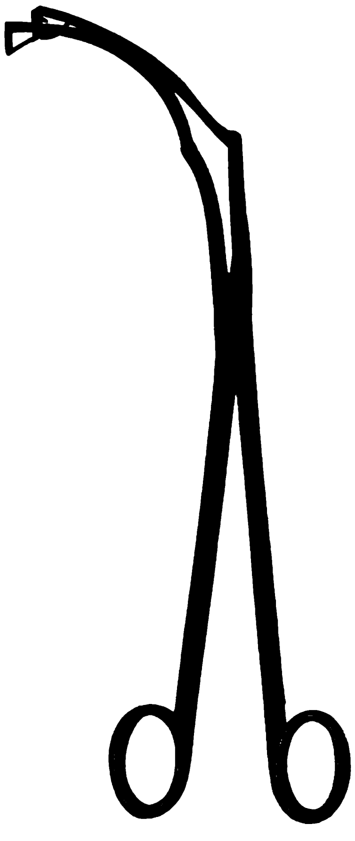
Again, growths within the ventricle of the larynx may require a division of the ventricular band by the knife, in order to bring them within reach of the forceps.

Fig. 99.



Tobold's perpendicularly cutting scissors (after Tobold).

Fig. 100.



Tobold's horizontally cutting scissors.

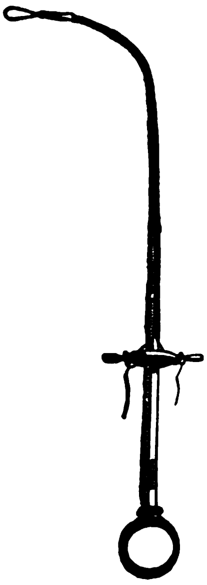
Scissors, or bladed forceps, have been sometimes used for the removal of growths of unusual hardness and favorably situated.

An idea of the appropriate instruments for all these purposes will be gained from the accompanying illustrations:—

The use of cutting instruments entails a good deal more hemorrhage than instruments for crushing or for evulsion.

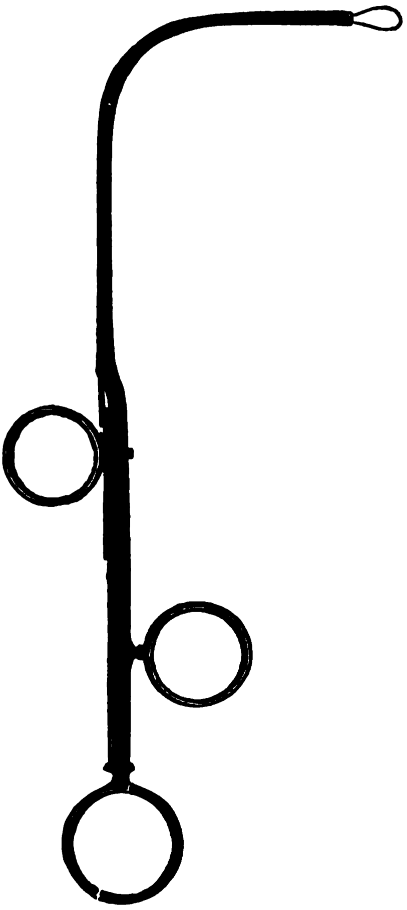
For the same purpose small guillotine knives of various forms, acting on the principle of the simple tonsillotome, have been devised by Türck, Stœrk, Lewin, and others; but their use has not been attended with a great amount of satisfaction.

Fig. 101.



Gibb's wire-snare for larynx (Gibb.)

Fig. 102.



Tobold's wire-snare for laryngeal growths (Tobold).

In cases of small growths favorably situated, Dr. Mackenzie prefers the use of rigid loops or rings of wire of various shapes, and presenting at various angles to the stock, the inner edge of the ring being sharpened, so that when the growth is encircled by the ring it can be jerked or scraped off.

Another class of cutting instruments, suitable for the removal of growths with narrow pedicles, consists in wire-snares, similar to those used by Wilde and others for the removal of aural polyps.

An instrument of this kind was first employed by Dr. Gibb for the removal of laryngeal growths, and in his hands, and in the hands of some others, has been used with considerable success. The great difficulty in its employment consists in ensnaring the growth, and in drawing the wire evenly round its base, a nicety of manipulation which the author has been unable to acquire; and therefore he has not resorted to this procedure for a number of years. In one case, in which he succeeded in encircling a polyp to his satisfaction, the wire broke on drawing it home, and he had some difficulty in disengaging it from the growth, being compelled to remove the wire from the instrument for that purpose. The growth in question was removed subsequently with a pair of curved forceps. These instruments have been called ecraseurs, but they do not act on the principle of the ecraseur, which is a crushing instrument. They cut through the tumor more after the manner of a knife.

Dr. Mackenzie speaks[1] of a true wheel ecraseur, which he has had made for the larynx, of his illustration of which he has kindly sent me an electrotype. He states that from the slowness with which it acts it can only be used when tracheotomy has been previously performed, or where the growth is external to the laryngeal canal. It is only adapted to large growths; and the inventor has succeeded in removing two by its means, one of the size of a cherry from the under surface of the epiglottis, and the other of the size of a bantam's egg, from the posterior surface of the cricoid cartilage. From the illustration, Fig. 103, it would appear that he uses a wire and not a chain.

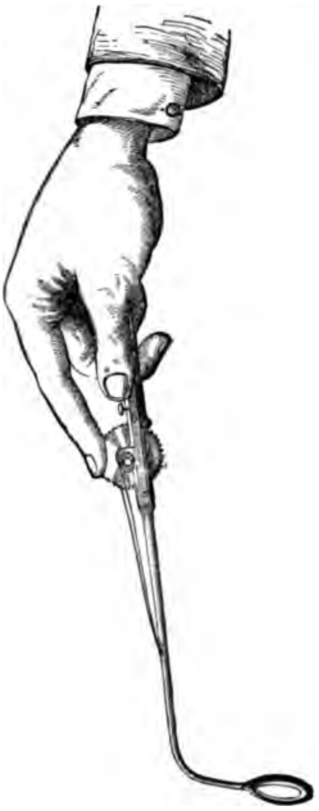
Tobold has constructed a real ecraseur, Fig. 104, provided with a small chain, such as is used in watches. I have tried to employ this instrument once or twice, but failed in my attempts to use it with any success.

---

[1] On Growths in the Larynx, p. 78.

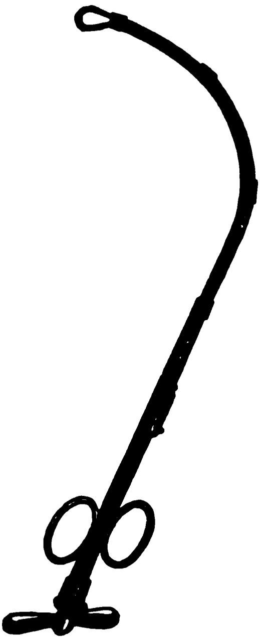
The galvano-cautery, as first suggested by Prof. Middeldorpf,[1] of Breslau, has been employed for the removal or destruction of laryngeal growths, and is recommended on the score of thoroughness of action and the slight risk of hemorrhage. The principle consists in cutting through the tumor by means of a loop or blade of platinum heated to a white heat by the electric current. The loop is passed around the growth, and drawn tightly, the same as

Fig. 103.



Guarded wheel ecraseur (Mackenzie).

Fig. 104.



Tobold's chain ecraseur (after Tobold).

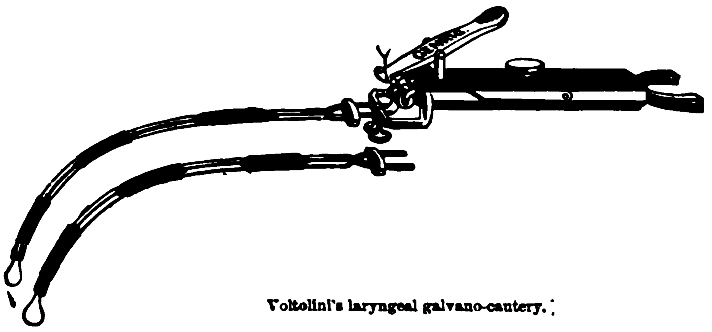
---

[1] Die Galvanokaustik. Breslau, 1854.

for removal by the wire-snare or ecraseur, and then the current being passed through it, the growth is cut through and usually comes away attached to the instrument. The blade is pressed through the growth.

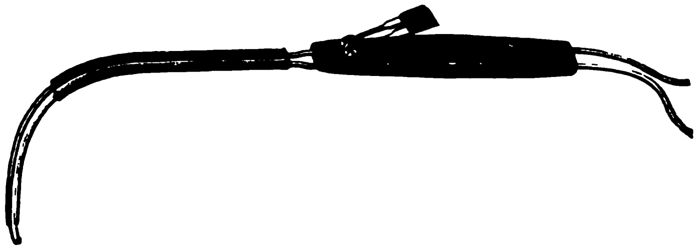
Fig. 105 represents the instrument devised for the purpose by Prof. Voltolini, of Breslau; and Fig. 106, a mere cautery or blade, much lighter in construction, devised by myself.

Fig. 105.



Voltolini's laryngeal galvano-cautery.

Fig. 106.



A simple form of galvano-cautery for the larynx.

Figs. 107, 108, 109, 110, 111, 112 represent the instruments employed by Prof. von Bruns of Tübingen; for the illustrations of which I am indebted to Doctors Beard and Rockwell, of New York.[1]

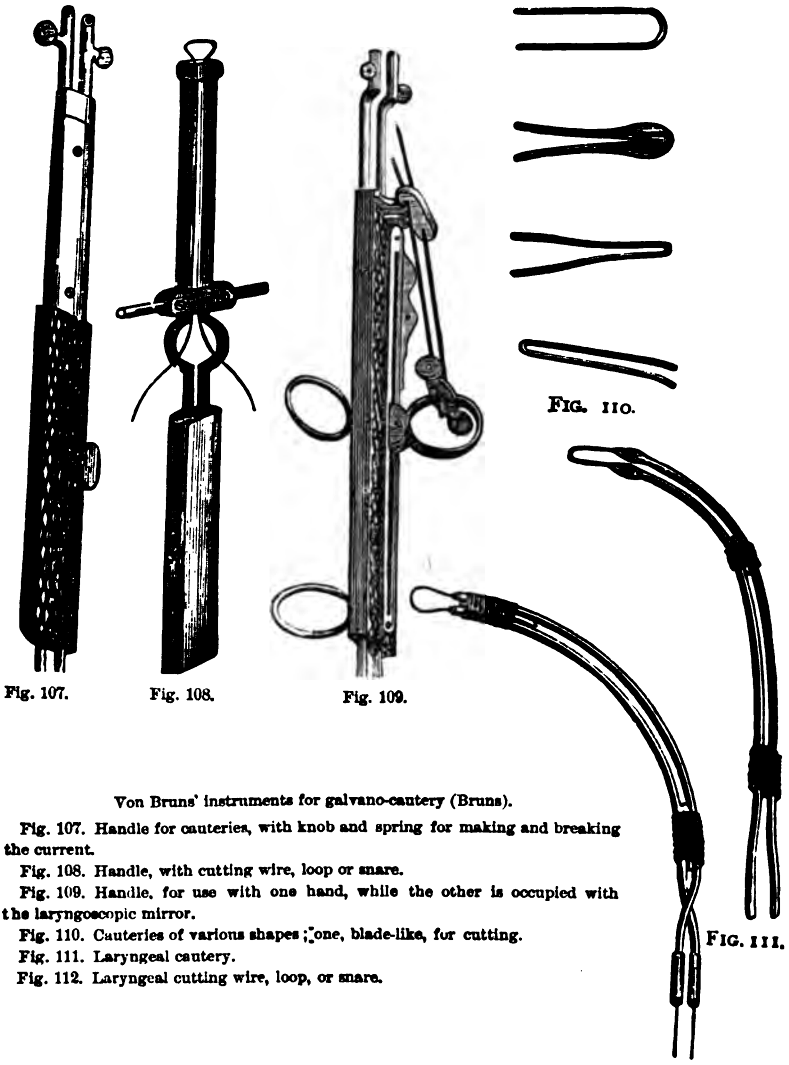
This method of treatment has been recommended by Voltolini,[2] von Bruns,[3] and others, and has often been used with suc cess; but on account of the infrequency with which one meets with cases calling for this treatment, and the trouble and expense attendant upon keeping a suitable voltaic apparatus in good

---

[1] Medical and Surgical Electricity. New York, 1871.

[2] Die Anwendung der Galvanokaustik im innern des Kehlkopfes und Schlundkopfes. Wien, 1867.

[3] Neue Beobachtungen von Polypen des Kehlkopfes. Tübingen, 1868. Die Galvano-Chirurgie. Tübingen, 1870.



Von Bruns' instruments for galvano-cautery (Bruns).

Fig. 107. Handle for cauteries, with knob and spring for making and breaking the current.

Fig. 108. Handle, with cutting wire, loop or snare.

Fig. 109. Handle, for use with one hand, while the other is occupied with the laryngoscopic mirror.

Fig. 110. Cauteries of various shapes; one, blade-like, for cutting.

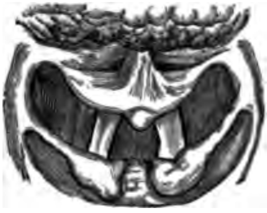
Fig. 111. Laryngeal cautery.

Fig. 112. Laryngeal cutting wire, loop, or snare.

order, and the difficulty of obtaining skilled assistance at the desired moment, the attendant inconveniences will render the employment of the galvano-cautery to be viewed as a surgical accomplishment rather than a surgical practice, at least as far as growths in the larynx are concerned, until such time as the technics for its manipulation shall become much simplified. I have resorted to it once or twice where I feared hemorrhage, and with less pain to the patient than the use of the ordinary caustic remedies. Dr. Da Costa, who witnessed one of these manipulations, was much struck with the small amount of inconvenience it produced. Dr. Mackenzie, whose experience in the treatment of laryngeal growths is perhaps unequalled anywhere in the world, does not recommend the galvano-caustic treatment. He found it give a great deal of pain in one instance, and produce acute œdema in two others. He recognizes no special advantages in the treatment, and considers the other modes of operating amply sufficient.

Fig. 113 is introduced for the purpose of showing a little growth on a depressed epiglottis, which induced cough by touching the pharynx in deglutition. As I was making some experiments with the galvano-cautery at the time this case came under treatment, the method was employed to destroy the tumor, which it did readily and with very little pain to the patient. But it might have been snipped off with horizontal scissors just as readily.

Fig. 113.



Pimple on the epiglottis, removed by galvano-cautery.

In cases of phthisis, some caution is necessary in interfering unnecessarily with a growth in the larynx, inasmuch as the resulting ulcer may not cicatrize kindly; and this may precipitate all the unpleasant accompaniments described in the account given of the chronic laryngitis of phthisis.

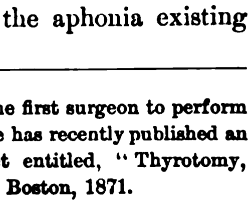
Under certain circumstances it becomes necessary to divide the larynx externally for the removal of morbid growths within it. This necessity arises sometimes on account of the position of the growth, rendering it inaccessible to intra-laryngeal procedure;

sometimes from the great size of the growth and the danger of hemorrhage in its extraction; and almost always when the growth is malignant in character. When a growth is malignant, no matter where it may be situated, if at all submitted to operative procedure, it is essential that every portion of it be removed—in the language of Prof. Gross, that "the very atmosphere of the morbid mass be removed," and this cannot be done without dissection; and dissection cannot be practised with instruments adapted to laryngoscopic surgery.

The division of the larynx may be performed at once, or not until after the previous performance of tracheotomy.[1] Where the growth is small, or even if it were large, and the probabilities were that after splitting the larynx, the operation for removal of the growth would be a simple one, such as strangulating or cutting out a tumor without ramifying adhesions, so that a comparatively slight amount of injury would be inflicted upon the intra-laryngeal structures, I would be inclined to open the larynx at once, without the previous performance of tracheotomy. Where, on the other hand, a great amount of injury of this kind is anticipated, injury which would lead to a good deal of inflammation, I would be inclined to perform tracheotomy in advance, in order to facilitate respiration and keep the injured parts at rest.

Fig. 114 represents the laryngoscopic appearance of a fibrous growth, for the removal of which I divided the larynx without having performed tracheotomy. The patient was a man aged 26 years, and a subject of phthisis. Dyspnœa, on account of which the operation was performed, was relieved; but although the growth was favorably situated, and the vocal cords were uninjured in the operation, the aphonia existing

Fig. 114.



Fibrous tumor on right vocal cord removed after thyrotomy, without tracheotomy.

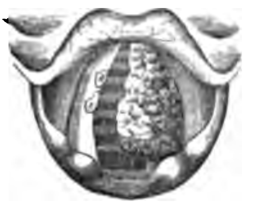
---

[1] Dr. Ephraim Cutter, of Boston, was, I believe, the first surgeon to perform this operation without recourse to tracheotomy. He has recently published an account of nine cases of the kind, in a pamphlet entitled, "Thyrotomy, for the Removal of Laryngeal Growths, Modified." Boston, 1871.

prior to the operation persisted after it. A detailed account of this case has been given elsewhere.[1]

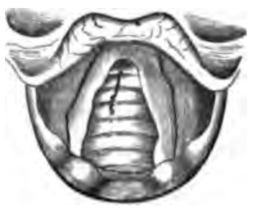
Figs. 115, 116, 117 represent three views of the larynx of a young gentleman, from whose left vocal cord and ventricle I removed a large epithelioma, as well as two much smaller growths from the right vocal cord, after the previous performance of tracheotomy. Fig. 115 represents the appearance of the growth at the time of the operation; Fig. 116, the appearance of the larynx a few months after the operation; and Fig. 117, the appearance of the parts nearly four years after the operation. In the last two figures the line of the tracheal incision is distinctly seen. An important feature in connection with this case, which is reported in detail elsewhere,[2] consists in the fact that there was a reproduction of tissue in the left vocal cord, the anterior portion of which had been purposely sacrificed in the removal of the growth, and from which an expansion took place to the other cord anteriorly, as well depicted in the drawings. This case was eminently successful as to the restoration of the voice, the patient declaring that, although a little rough, his voice is as good as it ever was. This shows us that the vocal cords, or a substitute for them, can be reproduced, and seems to confirm the view that they are mere duplicatures of elastic membrane, and not special structures.

Fig. 115.



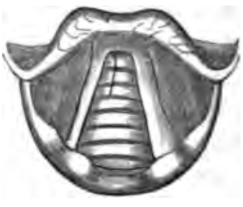
Laryngeal growths, for the removal of which thyrotomy was performed after tracheotomy.

Fig. 116.



Appearance of the parts some months after the operation.

Fig. 117.



Appearance of the parts some years after the operation.

I have seen some of these operations accomplished without any difficulty, and accompanied by very little hemorrhage. Others have been attended with serious difficulties.

---

[1] *The Medical Record*, vol. iv., p. 218.

[2] *Ibid.*, vol. iv., p. 244.

The first operation of thyrotomy for removal of laryngeal growth was performed by Brauers in 1833, and was followed by Ehrmann in 1843, and by Buck in 1851 and 1861,[1] since which time it has been frequently repeated.

In performing the operation of external section of the thyroid cartilage, for the removal of laryngeal growths, the patient is placed in the usual position for laryngotomy or tracheotomy, or may be seated upon a chair thrown back, and steadily supported. The anterior portion of the larynx being freely exposed by section of the skin and subcutaneous connective tissue, a vertical opening is made into the crico-thyroid ligament by a sharp-pointed knife, the blade presenting upwards, and this may then be carried upwards, separating the anterior wall of the larynx into halves, care being taken to keep in the middle line, to avoid wounding the vocal cords. If preferred, the section of the cartilage may be performed by means of a probe-pointed knife. The knife employed should be very strong; and a stout pair of angular scissors should be at hand, to be used for dividing the cartilage, should the latter be ossified or offer much resistance to the knife. If the growth present in the line of incision, it will be very apt to be wounded and give rise to hemorrhage. The severed halves of the thyroid cartilage are to be held apart by strong blunt hooks, for which purpose Dr. Cutler, of Boston, has devised[2] a pair of double pronged hooks, looking like a pair of old-fashioned table-forks, with the terminal ends turned downwards; the intention being to place one prong above the vocal cord and one below it, in using the instrument. The morbid growth is then removed by forceps, knife, scissors, ecraseur, or galvano-cautery, as may be deemed most expedient; and after the operation, the raw places should be cauterized with nitrate of silver, or with a comparatively strong solution of acid nitrate of mercury. The wound is allowed to come together naturally, and the parts are held in position by adhesive strips externally. There is no necessity to place a suture in the cartilage, or even in the skin. Some disturbance of the parts must ensue during the paroxysms of cough that usually continue for a few days after an operation of this kind. A simple dressing is all that is required. When the wound is dressed, a full opiate should be administered. Liquid nourishment can usually be taken from the very first, though swallowing is sometimes difficult for a few days.

---

[1] Mackenzie. Growths in the Larynx, p. 89.

[2] *Am. Jour. Med. Sci.*, January, 1867.

During the operation it is very essential that the blood should be promptly sopped up by small bits of sponges, securely attached to forceps, or what I prefer, to rods of whalebone; and several of these should be at hand. In one of my operations, an assistant, excited by the spattering of the blood accompanying the spasmodic heaving of the respiration, induced in these operations by the presence of blood and the direct access of cool air, dropped a piece of sponge from the forceps, and it was absolutely on its way down the trachea in the inspiratory current, when I seized it with the forceps and extracted it. The possibility of such an untoward accident may be avoided by securing the sponge firmly and permanently to its holder. Recovery from these operations is usually prompt, unless the general state of the constitution has become much impaired beforehand.

The mere opening of the larynx is a matter of little difficulty, but the extirpation of a tumor with extensive attachments is a matter of a good deal of labor and responsibility; on the one hand on account of the spasmodic heaving of the parts at every touch of the knife or other instrument, and on the other hand on account of the passage of blood into the trachea.

It is not a settled question, whether the use of anæsthetics should be employed for the performance of these operations. All in which the author was interested as principal or assistant were performed under the influence of anæsthesia, the effect of which as a rule was very satisfactory. In one case, however, in which I was assisting Dr. Elsberg of New York at the time, the patient, an elderly man, nearly died from the chloroform, and after he was revived the operation had to be finished without further resort to anæsthesia. In another instance which I have reported in detail,[1] death actually occurred from the administration of the anæsthetic. It must not be forgotten, in this connection, that if the integrity of the glottis is already compromised by the presence of a large neoplasm, there is danger of death by suffocation during the administration of an anæsthetic, despite the usual relaxing influence of such an agent. It would be well, therefore, in cases where there is any doubt upon the propriety of employing anæsthesia, to make the initial incision beforehand, inasmuch as statistics show us that death is much less likely to occur when an anæsthetic is administered for relief from pain, than when it is given for the purpose of preventing pain.

---

[1] *The Medical Record*, vol. iv., p. 265.

After removal of a growth by this means, the parts from which it has been removed should be thoroughly cauterized with lunar caustic or the acid nitrate of mercury, with a view of repressing repullulation.

In all cases of intense dyspnœa threatening suffocation, connected with a growth in the larnyx, laryngotomy or tracheotomy should be performed as an initial measure, even when it is intended to extract the growth through the mouth. The danger of provoking spasm by tentative efforts is not to be underrated. In addition to this, the laryngeal or tracheal wound can be taken advantage of for gaining access to the neoplasm, as has been practised by Mackenzie, von Bruns, and others; the manipulation being guided by the laryngoscope.

If tracheotomy have been performed previous to the removal of malignant growths, or benign growths with a disposition to recurrence, it would be well, unless strongly contra-indicated, to retain the use of the canula for a greater or shorter time. This would afford two avenues to the new growth, and insure freedom of respiration should the new growth enlarge rapidly.

Patients from a distance should be taught the art of autolaryngoscopy, so that they can examine their own laryngeal structures from time to time, and detect any recurrence of growth in its early stages.

Scirrhus and encephaloid growths in their advanced state are, as a rule, not suitable for radical operation, inasmuch as so much of the surrounding structures are usually involved as to render complete removal impossible without the sacrifice of important functions. True, it has been proposed to remove the entire larynx, and the operation has been performed by Czerny successfully on the lower animals. In a case of scirrhus of the larynx, which I examined a year or two ago with Prof. Post of New York, that gentleman proposed removal of the mass, including as much of the larynx as would be necessary for that purpose; and he would, in all probability, have performed the operation had the patient not committed suicide. We can conceive of the possibility of a man's living without a larynx, and that there are many individuals who would prefer living as mutes, and feeding by the stomach tube, to not living or feeding at all. Nevertheless, the operation is hardly to be considered justifiable in cases of malignant growth.

Another method of external operation for the removal of laryngeal growths remains to be spoken of. This is the operation of supra-thyroid laryngotomy, or sub-hyoidean pharyngotomy, as it is called, a method of gaining access to the pharynx and to the larynx by drawing the epiglottis through a wound made in the external tissues. This operation was proposed by Malgaigne [1] and by Vidal de Cassis, and was performed for the first time, on the person of an American gentleman, by Dr. Prat,[2] a French naval surgeon, stationed at the time at Papiete, the capital of Otaheite. A fibroid tumor existed on the epiglottis, which could be felt with the finger, but it could not be extracted through the mouth. The patient, who was the subject of advanced pulmonary phthisis, suffered also from extreme dysphagia, which finally increased to veritable aphagia. There was also difficulty of breathing. The patient, who could neither eat nor drink, insisted on being relieved, and Dr. Prat operated in accordance with the directions of Malgaigne. The transverse incision 2-3 millimeters in length, through the thyro-hyoid membrane, brought him down to the epiglottis, upon the left side of the laryngeal face of which the tumor was found. It was seized with forceps, and excised with scissors. No vessels required ligature. The edges of the wound were united by suture, and a dressing was applied rather tightly. The wound healed rapidly, and the troubles of respiration and deglutition subsided. The patient died shortly afterwards from phthisis, and at the autopsy no trace of the growth was to be found.

---

[1] *Manuel de Méd. Operatoire.* Paris, 1835.

[2] (*Gazette des Hôpitaux*, 1859, No. 103) Elsberg's Prize Essay on the Treatment of Morbid Growths within the Larynx. Phila. 1866, p. 15. Mackenzie; On Growths in the Larynx, p. 98.

In 1863, Dr. Follin[1] performed a similar operation with complete success. The patient was a young man, aged 21 years, whose respiration was normal when in the horizontal position, but who could not breathe when standing upright. His symptoms were due to the presence of several fibro-cellular or myxomatous growths, which had formed rapidly, and were thought to be situated on the posterior wall of the larynx. The neoplasms were extirpated, and the patient was entirely cured.

Prof. Langenbeck also has operated[2] in this manner. His first operation was July 4, 1862, performed upon the person of a man, forty-seven years of age, from whom a pharyngeal tumor about an inch in circumference had been removed by Prof. Middeldorpf in 1859, by means of the galvano-cautery. The tumor had grown again to very large dimensions, and threatened death by suffocation. The operation was a difficult one, requiring the use of some twenty-five ligatures to control the hemorrhage. The patient died on the second day after the operation.

Prof. Langenbeck operated a second time, and successfully, in August, 1869, upon a female aged fifty years. The tumor arose from the left aryteno-epiglottic fold, stretched with a broad base to the left side of the pharynx, and was so firmly attached to the left arytenoid cartilage, that the cartilage was brought through the external wound along with the growth, which latter was then carefully separated from it. The tumor, when removed, was of the size of a large pigeon's egg, irregular in outline, and not unlike an hypertrophied tonsil in general appearance. Microscopically examined, it was determined to be a fibro-myxoma.

---

[1] *Archives Générales de Méd.*, February, 1867. Mackenzie; On Growths, etc., p. 99.

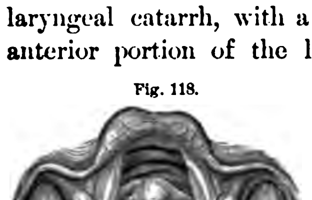
[2] *Allgemeine Medicinische Central-Zeitung*, 1870, Nos. 8, 9, and 10, pp. 93, 103, and 115.

In 1863 Dr. Debron[1] performed this operation for the removal of a tumor which, during the operation, proved to be situated in the ventricle of the larynx. The thyroid cartilage was then divided, when it was found that the tumor extended from the right aryteno-epiglottic fold to the distance of 2-3 millimetres below the vocal cords. It was removed with the ecraseur. Tracheotomy was then performed and a canule inserted. The patient died on the seventh day from the resulting bronchitis, which Debron attributed to the unnecessary tracheotomy which he had performed.

TUMORS OF THE TRACHEA.

Tumors occur in the trachea also, and are recognized in the laryngoscope. Their removal usually necessitates laying the tube open from the outside. Occasionally, however, a tumor may be removed from the trachea through the mouth, as exemplified in the following case of extirpation of a sarcoma from the trachea, successfully performed by Dr. Schrötter, a verbal account of which I had from an eye-witness, Dr. Aub, of Cincinnati. The case is so rare, and the skilful extirpation so highly creditable to the operator, that no apology is necessary for presenting an extract of the detailed report in the *Wien Medicinische Jahrbücher*, xv. Band, 1 Heft, 1868, pp. 64–72.

Fig. 118.



Dr. Schrötter's case of tumor of the trachea (Schrötter).

The patient was a journeyman house-painter, æt. thirty-four, who had been under treatment for a long time for chronic laryngeal catarrh, with a slight cicatricial contraction of the anterior portion of the left vocal cord. Finally the laryngoscopic examination revealed the existence of a tumor (Fig. 118) upon the anterior wall of the trachea, in the region of the fourth tracheal cartilage, and in its posterior portion it seemed as broad as the dilated glottis. It was of a pale red color, covered here and there with yellowish mucus. The tumor was observed to move with forced respiration, showing that it had a pedicular attachment to the posterior wall of the trachea.

---

[1] *Allg. Med. Cent.-Zeit.*, No. 9, p. 105.

Local anæsthesia was produced by the pencilling first with chloroform, and then subsequently, at intervals of about an hour, with a solution of the acetate of morphia—10 grains to the drachm of water.[1] Portions of the tumor were removed by the forceps on several occasions, and finally the portion remaining was injected with a solution of the sesquichloride of iron, two parts to one of water, which produced cauterization and shrinking of the tumor, to a mere immovable stump.

It would have been a better and safer practice to have opened the trachea externally, and have removed the entire tumor at once, cauterizing the points of attachment to prevent repullulation. As a sample of pluck and patience on the part of the operator, and endurance on the part of the patient, the case is unique, and its report worth perusal by those interested.

A case of polyp of the trachea is recorded[2] by Dr. Fifield. The patient, a female, was subject to attacks of dyspnœa, and for four days before death sat with her forehead on the back of a chair. The left bronchus was perfectly covered by a firm rosy polyp, the size of a small grape; the pedicle was attached to the trachea at the mouth of the bronchus, where it had acted as a ball-valve, permitting expiration, but preventing inspiration. The case was unconnected with any disease of the lungs.

Dr. Gibb mentions[3] a case of cystic tumor (cyst or abscess?) on the anterior wall of the trachea, which burst spontaneously.

Prof. Türck[4] has observed several cases of tumor of the trachea, some of which he discovered on the laryngscopic inspection; and one of these was associated with growths in the upper portion of the left bronchus.

---

[1] This method of inducing tolerance of the parts preparatory to operating within the larynx is much used in Germany, but I do not think it is in favor elsewhere. Dangerous narcotism is sometimes produced, and this has in some instances proved fatal. Prof. Pancoast informed me that a result of this kind occurred during his recent visit to Vienna, and I have been told of other instances by reliable gentlemen engaged in studying the art of laryngoscopy abroad at the time.

[2] (*Boston Med. and Surg. Jour.*, Nov. 14, 1861.) Gibb, *op. cit.*, p. 392.

[3] Op. cit., p. 392.

[4] Klinik der Krankheiten des Kehlkopfes und der Luftröhre. Wien, 1866, p. 502, et seq.

Most of the cases of so-called tumors of the trachea, however, are involutions of the tube caused by the compression of tumors external to the windpipe; or extension inwards of tumors from the œsophagus, the latter class of affections being usually malignant. The description of a marked case of this kind is illustrated in the work of Dr. Gibb,[1] in which the calibre of the tube was almost entirely filled by an oval tumor an inch and a quarter in length, growing from the posterior wall and blended with œsophageal disease.

No special symptoms of tracheal tumor would be recognized, as a rule, until the size of the growth was such as to produce stridor, or impede respiration. Early in its growth, its existence might possibly be recognized or suspected by dry, sonorous râles otherwise unaccounted for. Tumors in connection with the œsophagus would be accompanied with symptoms of dysphagia or stricture, in addition to whatever special tracheal symptoms might be present.

FOREIGN BODIES IN THE LARYNX AND TRACHEA.

Foreign bodies frequently gain access into the air-passages, and when not promptly expelled by coughing, usually become impacted in some portion of the larynx or trachea, though they occasionally lodge in the bronchi. These foreign bodies may gain access from the outside, as in the well-known case of La Martinière, who detected a small wound in the neck of a boy who had been suddenly seized with a paroxysm of suffocation while playing with a whip. The wound was cut down upon, and a pin extracted from it. The pin had been attached to the whip-cord, and had penetrated into the trachea.

A purulent bronchial gland has been known to become detached, and thus produce sudden death by suffocation. Matters vomited from the stomach during a state of insensibility have been known to inundate the air-passages, and thus produce death. An accident of this kind sometimes occurs in the new-born babe, the matters usually consisting of mucus and meconium. Parasitic worms sometimes find their way into the air-passage from the alimentary canal; and insects and other animals from the nose.

---

[1] Op. cit., p. 391.

The most frequent cause of the entrance of foreign bodies into the air-passages is due to sudden inspiration while the body is in the mouth. Hence, many accidents of this kind occur in children who are very apt to put things into their mouths while at play.

All the works on surgery contain reliable articles on the subject of foreign bodies in the air-passages, and it is therefore unnecessary, in the present volume, to do more than give a general description of the nature of the accident, the symptoms it gives rise to, and the treatment indicated. For this purpose the author has seen fit to draw largely upon the classical work of Prof. Gross,[1] which contains all the essential information that can be gained on the subject, with the single exception that these bodies, when lodged in the larynx, or in certain portions of the trachea, can sometimes be seen in the laryngoscopic mirror—an instrument introduced into the practice of medicine and surgery subsequently to the publication of Dr. Gross's volume. When they can be so seen, and an examination of this kind should not be neglected when time and opportunity permit, valuable information is obtained as to the position of the foreign body, and the selection of the proper operation for its extraction. In certain favorable cases, the foreign body, when situated in the upper portion of the larynx, can be seized with a pair of laryngeal forceps under guidance of the laryngoscopic mirror, and be safely extracted through the mouth. When the foreign body is situated beneath the glottis, such an operation is not advisable, on account of the danger of producing suffocation by spasm of the glottis, or by impaction of the foreign body between the lips of the glottis in the effort at extraction. Only when the body is small or slender, and favorably situated for seizing and withdrawing it, should this operation be attempted.

---

[1] **A Practical Treatise on Foreign Bodies in the Air-Passages. Phila., 1854.**

An instructive case of this nature occurred recently in my own practice, in the case of a lady sent to me from a neighboring city. The foreign body, a piece of beef bone, had been inhaled into the larynx while eating soup, two years and a half before. On examination, I saw the bone below the vocal cords, impacted between the anterior and posterior walls of the cricoid cartilage, which had undergone caries at these points. I made an attempt to seize the body with a pair of laryngeal forceps, and readily succeeded, but a good deal of force was necessary to dislodge it, and the instrument was withdrawn without the foreign body within its grasp. A moderate amount of hemorrhage followed, accompanied by violent paroxysms of spasm of the glottis, which continued for about half an hour, and were eventually allayed by the inhalation of ether. A subsequent laryngoscopic examination showed that the foreign body had been detached from its connections posteriorly, and that it was hanging by its anterior attachment. It had caught under the vocal cords in their spasmodic contraction during the operation, and had thus been dragged out of the grasp of the forceps. I declined to interfere further through the mouth, and subsequently performed tracheotomy, with the assistance of Drs. Packard and Sinkler. The bone, which was distinctly seen just before the operation, could not be found after it, and it was concluded that it had become detached, coughed up, and swallowed during the spasms of coughing with which the operation was attended; and the case has done well ever since. The ulceration of the cricoid cartilages healed kindly, their progress being watched with the laryngoscope. A day or two after the operation, a small piece of bone was found plastered by a clot of blood to the wall in front of the position occupied by the operating table, but it represented only a small portion of the bone seen with the laryngoscope.

A small fish-bone, and several pins, which had been inhaled into the larynx, I have extracted, without difficulty, under guidance of the laryngoscope; but they were favorably situated above the glottis. Most of the foreign bodies which gain entrance into the air-passages are of hard consistence, and not likely to undergo alteration of size. Vegetable and animal matters, on the other hand, are liable to become increased in size from imbibition of moisture, and therefore add gravity to the prognosis.

The foreign body may lodge in different portions of the larynx or trachea, or may remain loose in the windpipe, and move up and down it with the efforts of respiration. When a foreign body is not arrested in the larynx or trachea, it usually falls into one of the bronchial tubes, more frequently into the right tube. The cause of this peculiarity is shown by Prof. Gross to depend upon the anatomical arrangement of the septum at the root of the trachea, where that tube divides into the primary bronchi. This bronchial septum is to the left of the middle line, and thus a foreign body striking it is apt to be deflected to the right, its passage in this direction being favored by the greater calibre of the right bronchus. Sometimes a foreign body falls into each bronchus; and sometimes it passes through the bronchus into one of its subdivisions.

The immediate effects of the entrance of a foreign body is usually a severe paroxysm of pain and coughing, with more or less dyspnœa, due to the spasmodic action excited in the laryngeal muscles. Sometimes suffocation takes place on the instant. The symptoms of an accident of this kind are thus graphically described by Prof. Gross: " The patient is seized with a feeling of annihilation; he gasps for breath, looks wildly around him, coughs violently, and almost loses his consciousness. His countenance immediately becomes livid, the eyes protrude from their sockets, the body is contorted in every possible manner, and froth, and sometimes even blood, issue from the mouth and nose. Sometimes he grasps his throat, and utters the most distressing cries. The heart's action is greatly disturbed, and not unfrequently the individual falls down in a state of insensibility, unable to execute a single voluntary function. In short, he is like one who has been choked by the hand, or by the rope of the executioner. Sometimes a disposition to vomit, or actual vomiting, occurs immediately after the accident, especially if it take place soon after a hearty meal. The relief occasionally experienced from this source is very great. In some instances, again, there is an involuntary discharge of fæces, and even of urine."

"The duration of the first paroxysms varies from a few seconds to several minutes, or, in severe cases, as when the foreign body is arrested in the larynx, even to several hours. With the restoration of the respiration, the features resume their natural appearance, and the patient recovers his consciousness and power of speech. The voice, however, frequently remains somewhat altered, the breathing is more or less embarrassed, and the individual is harassed with frequent paroxysms of coughing, attended often with a recurrence of all, or nearly all, the original symptoms. Thus the case may progress for an indefinite period, until the foreign body is expelled, or until it produces death by functional or organic disease of the air-passages."

Sometimes the symptoms are very slight, and under these circumstances the foreign body, when hard and of smooth contour, may remain for a long time without producing injury. I have met with two instances of such sojourn of foreign body for upwards of ten years, the body, in one instance a pebble, being ejected spontaneously in a fit of coughing, long after the occurrence of the accident had been forgotten.

The effects of the sojourn of a foreign body, as enumerated, and discussed in detail by Prof. Gross, are: inflammation of the mucous membrane of the larynx, trachea and bronchi; sometimes inflammation of the lungs, and this inflammation may be followed by ulceration; the formation of abscesses; a deposit of tuberculous matter; œdema of the larynx; pulmonary emphysema; enlargement and softening of the bronchial lymphatic ganglions; effusions of serum and lymph, and occasionally of pus in the pleura; extensive adhesions, and sometimes inflammation of the heart, pericardium, and liver.

When a foreign body has been retained in the air-passages for a long time it occasionally becomes encysted. At other times it is expelled through the mouth, or by ulceration through the walls of the chest.

The diagnosis of a foreign body in the air-passages, in the absence of direct history, is mainly based upon the suddenness of the onset of the symptoms. Auscultation of the trachea and lungs also assist in the diagnosis; in the first instance when the body is loose, and in the latter instance when it is impacted in one of the bronchial tubes. All the symptoms of a foreign body in the air-passages may be produced by impaction of a foreign body in the pharynx or œsophagus. The finger and the œsophageal sound will determine this point in most instances. Care should be observed in these examinations, as they are not always unaccompanied with danger.

Spontaneous expulsion of the foreign body often takes place, usually followed by recovery, but sometimes followed by death. Expulsion is often produced under the action of emetics and errhines, but the danger of producing impaction of the body within the larynx presents a serious objection to their use.

Inversion of the body and succussion of the chest and back is liable to the same danger of producing impaction. Still, these methods have proved successful in many instances.

The proper treatment for a case of foreign body in the air-passage consists in making an artificial opening below the glottis in order to afford the best chance for the expulsion or extraction of the body, and to avoid the danger of suffocation by spasm of the glottis. An operation of this kind may become a serious matter if there exist any considerable pulmonary complication. Laryngotomy is preferred in the adult when it is evident that the foreign body is in the larynx. Sometimes, though rarely, more or less complete division of the thyroid cartilage is required, as, for instance, when the body is impacted in one of the ventricles of the larynx and cannot be dislodged through the wound in the crico-thyroid membrane. In cases of foreign body in the trachea, and also in most cases occurring in small children, the operation of tracheotomy is to be preferred, as admitting of a larger opening and the freer play of instruments passed through it. The opening should be sufficiently large to permit the ready escape of the foreign body, and should in all cases exceed the length of the glottis of the individual. At least one inch and a quarter in the adult, and not less than one inch in the child, is the rule laid down by Prof. Gross.

Very often, as soon as the air-passage is open, the foreign body is ejected, in a fit of coughing, from the wound or from the glottis, and under the latter circumstances it may lodge in the mouth or pass down the œsophagus. At other times it presents at the lips of the wound, whence it is readily extracted with forceps. If the foreign body does not move towards the exterior, it is customary to turn the patient upon the face and to strike the chest or back with the hand. It has also been recommended to blow strongly into the wound so as to compress the air within the trachea, that it may gather expulsive force in the coughing which follows.

If these manœuvres do not succeed in the expulsion of the body, instruments must be passed into the air-tube for that purpose. Great care should be taken in manipulations of this kind, as they usually provoke violent paroxysms of cough, and in this way endanger the mucous membrane of the parts. All instruments ought to be warmed before being passed into the trachea, as they will be much less likely to cause severe spasm than the contact of cold instruments. The instrument employed will vary with the nature of the case and the resources of the surgeon. A long bent probe with a blunt hooked extremity will often be of service. So also a pair of delicate curved forceps, such as are used for torsion of nasal polyps. I have used the curved portion of the laryngeal forceps with success. Whatever instrument is used should be first employed as a sound until the location of the foreign body is discovered, when suitable efforts may be made at extraction. When the body lies at the commencement of one of the bronchi, care must be taken that it is not pushed farther on in the manipulation. Under these circumstances a stout wire, terminating in a small blunt hook, may be insinuated past the body and then drawn upon to dislodge it, when it will be likely to be coughed out or coughed within grasp of the forceps at the seat of the wound. Efforts at extraction should not be prolonged for many minutes. It is much better practice to keep the wound open by hooks, or by ligatures passed through its edges and fastened round the neck, and to repeat the efforts at removal in a few hours or upon the following day. Meanwhile the wound should be covered by a fold of thin muslin to modify the temperature of the air. Very often the foreign body is expelled through the wound thus left open, during the absence of the surgeon.

The wound should be kept open until the foreign body has been expelled; and if this does not take place for a long time, a canula may be worn to keep it patulous; but under ordinary circumstances the canula will be in the way and prevent the expulsion of a foreign body situated below it. Under these circumstances, should there arise any evidence of the dislodgment of the body, the canula should be promptly withdrawn to give it chance to escape.

As long as the wound is kept open, the air of the apartment in which the patient resides should be kept warm and moist by the evaporation of steam. When the foreign body has been expelled, or when from other reasons it is deemed desirable to close the aperture, the edges of the cutaneous wound are brought together by adhesive strips, and sutures if necessary. A simple dry dressing is usually all that is requisite. The wound usually heals kindly in a few days, unless kept patulous in part by convulsive or catarrhal cough and the escape of air, under which circumstance a permanent tracheal fistule is sometimes produced.

APHONIA.

Aphonia, or complete loss of voice, occurs in connection with various laryngeal affections of inflammatory origin, and is the result of a mechanical impediment to the approximation of the vocal cords, such as cicatrization, the presence of a tumor, or a condition of swelling in the arytenoid cartilages or in other structures, preventing the apposition of these parts in attempts at phonation. Sometimes there is an impediment due to vibration of the cords in consequence of the pressure upon them of a tumor, or of swollen ventricular bands. When the loss of voice is incomplete, it is designated as dysphonia, a term synonymous with raucitas or hoarseness; and this modification of voice is attendant, in some degree or other, upon almost all diseases of the larynx. These forms of defective voice have already been discussed, in part, in connection with the consideration of the diseases in which they occur. They are designated as organic aphonia, or aphonia with apparent cause. There are, however, other forms of organic aphonia very liable to be confounded with still another form of the affection occurring without apparent cause, and denominated functional aphonia; these examples of organic aphonia occurring in connection with morbid growths, aneurisms, and other tumors outside of the larynx, pressing upon the laryngeal recurrent nerve, and thus paralyzing the vocal muscles. Still another form of organic aphonia, also confounded with functional aphonia, exists in certain cases of cerebral disease, metallic poisoning, etc., in which the spinal accessory nerve is paralyzed, and, as a matter of course, the recurrent laryngeal fibres in it.

A form of aphonia occurring independently of organic disease is frequently met with, and is often denominated functional aphonia, or nervous aphonia. In these cases there is paralysis of some of the muscles attached to the vocal cords, preventing their approximation, or their due tension when in apposition, and thus destroying the physical conditions on which the formation of the voice depends.

Cases of this kind occur very frequently in connection with hysteria, and most frequently in females; but they are by no means confined to subjects of hysteria.

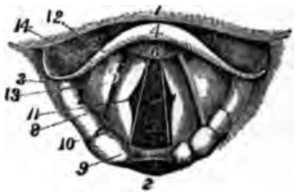
The physical and immediate cause of aphonia in the instances referred to will be readily comprehended by a cursory glance at the subject of the formation of the voice. The sole factors of voice are the lower or true vocal cords; or *the vocal cords*, as they have been denominated in this volume; the false vocal cords being called *ventricular bands*, in compliance with transatlantic nomenclature. These vocal cords, one on either side, are membranous reeds which become approximated in vocalization, so that a very narrow slit between them affords the only passage for the expiratory current of air. This current of air as it passes between the tense membranes sets them in vibration, exactly on the same principle that the current of air from the bellows of the accordion sets the reeds of that instrument in vibration.

The following figures from Czermak,[1] and borrowed from Bennett, will roughly illustrate the appearance of the cords before phonation, and during phonation when they are brought together and rendered tense by the combined action of the various laryngeal muscles. The vocal cords are in contact anteriorly by the vocal processes of the middle plate of the thyroid cartilage. In phonation they are brought together posteriorly by the action of the transverse and oblique fibres of the arytenoid muscle; they are rendered tense and stretched vertically by the action of the crico-thyroid muscle; they are stretched transversely and shortened by the thyro-arytenoid muscles; and they are slackened and shortened by the action of the lateral crico-arytenoid muscles. When these muscles relax, the cords are separated by the action of the posterior crico-arytenoid muscles. These effects can be produced in the exsected larynx by electricity, or be perceived in the living larynx by means of the laryngoscope.

---

[1] Der Kehlkopfspiegel, Leipzig, 1863.

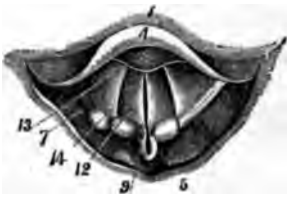
Fig. 108.



Appearance of larynx as vocalization is about to commence (after Czermak).

1. Base of tongue.
2. Œsophageal entrance.
3. Aryteno-epiglottic fold.
4. Epiglottis.
6. Pad, or belly of epiglottis.
8. Cartilage of Wrisberg.
9, 10. Cartilage of Santorini.
11. Vocal process.
12. Vocal cord.
13. Ventricular band.
14. Ventricle.

Fig. 109.



Appearance of the glottis in vocalization. (Czermak.)

1. Base of tongue.
4. Epiglottis.
6. Pad of epiglottis.
7. Aryteno-epiglottic fold.
9. Cartilage of Santorini.
12. Vocal cord.
13. Ventricular band.
14. Ventricle.

It may not be amiss here, as a guide in the study of defects of voice, to indicate the physical condition of the vocal cords in the rise in pitch and in the formation of the chest, falsetto, and head-registers of the human voice.

The rise in pitch is due to a stretching and shortening of the cords. This is done on either side by the action of the lateral crico-arytenoid muscle, which draws the arytenoid cartilage forward and outward, thus turning the vocal processes inward, and stretching the cords posteriorly. At the same time the crico-thyroid muscle, drawing the thyroid cartilage down upon the cricoid with a forward rotary motion, stretches the cord anteriorly. While the cords are being stretched in their length in this manner, the thyro-arytenoid muscle to which the outer portion of the cord is inseparably attached, and which may be called the vocal muscle *par excellence*, stretches the cord laterally, thus rendering it tense enough to act as a reed and to be set into vibration by the passage of the current of air. The complexity of this muscle is such that, by a partial action of one set of fibres, it produces a slight bulging upward or vaulting of the vocal cords, and assists in their shortening.

When the action of the parts is viewed in the laryngoscope during the emission of the chest register, we see the arytenoid muscle contract and compress the arytenoid cartilages together; and, as the voice rises in the scale, the arytenoid muscle gradually contracts more and more, shortening the chink of the glottis, which is still further gradually shortened anteriorly by the increasing contraction of the anterior fibres of the thyro-arytenoids. This occurs more and more at every higher note, until a point is reached at which, if this action is continued, the vocal cords become congested, showing that there is now undue tension; and this point marks the natural limit of the chest register. During all this time *the vocal cords vibrate in their entire breadth*, and this constitutes the essential feature of this chest register.

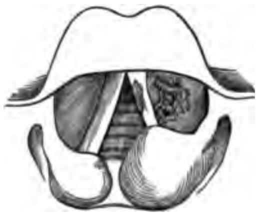
In the formation of the falsetto register, the glottis again lengthens as before, the vocal cords seeming longer than during the formation of the chest tones, and less vaulted in form. As the higher notes are produced, a similar action of shortening occurs to that already described, until a point is again reached where signs of congestion appear, marking the upper limit of this register. During all these notes *the edges alone of the vocal cords are in vibration*, constituting the essential feature of the falsetto register.

In the production of the head tones, which are only produced in larynges whose arytenoid cartilages have very long vocal processes, these vocal processes become tightly compressed together, *completely closing the posterior portion of the glottis, so that there remains open only a slender elliptical fissure anteriorly*, which seems to occupy but little more than one-half of the length of the cords, and during the emission of the voice the edges of this oval opening vibrate. *This complete closure of nearly the entire half of the glottis posteriorly* constitutes the peculiarity of the head voice.

With this digression on an imperfectly understood portion of physiology we can better understand the varieties of nervous or paralytic aphonia which are met with in practice, and which are usually termed functional aphonia.

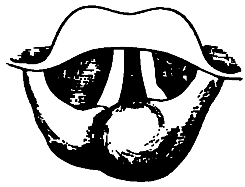
Paralytic aphonia may involve both cords or only one. In the latter case the voice is not always entirely lost, there being often a condition of dysphonia merely. The condition in the laryngoscope is very marked. The sound cord approaches the middle line in an attempt at phonation, but the paralyzed cord does not move to meet it. In some instances the sound cord crosses the middle line and approaches the paralyzed cord sufficiently to satisfy the physical conditions necessary to insure vibration, and it is in such instances that we have a rough, imperfect voice. Occasionally, the voice will remain almost natural in intensity, pitch, and quality, and give rise only to a loss of power of modulation. Cases of this kind are, according to the author's experience, almost always connected with cerebral disease, phthisis, metallic poisoning, or the pressure of an aneurismal or other tumor upon the inferior laryngeal nerve. In the cases of phthisis, the paralysis will be almost always

Fig. 119.



Paralysis of left vocal cord in a case of phthisis. Appearance during respiration.

Fig. 120.



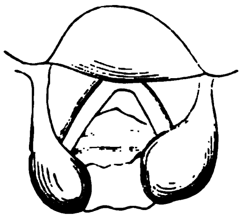
Paralysis of left vocal cord in a case of phthisis. Appearance during attempt at phonation.

observed on the same side as that which is the seat of the earliest deposit.

Figs. 119 and 120 represent one of the author's cases of paralysis of the left vocal cord occurring in phthisis, and producing aphonia. Fig. 119 represents the parts during expiration, and Fig. 120 their appearance in phonation, in which it will be seen that the right cord slightly passes the middle line. An ulceration is seen upon the ventricular band of the same side, and the mucous membrane covering the corpuscle of Santorini of the same side, is swollen from sub-mucous infiltration.

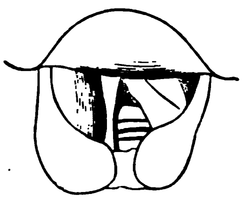
Figs. 121 and 122 sketch a somewhat similar condition occurring in a case of aneurism of the arch of the aorta, and also attended by aphonia.

Fig. 121.



Paralysis of left vocal cord in a case of aneurism of the aorta. Appearance during respiration.

Fig. 122.



Paralysis of left vocal cord in a case of aneurism of the aorta. Appearance during attempted phonation.

Fig. 121 represents the parts in ordinary respiration, and Fig. 122 the same parts in attempts at vocalization. Both these cases terminated fatally: the first in the ordinary slow course of consumption; and the latter suddenly, by hemorrhage, from rupture of the aneurism into the pulmonary artery.

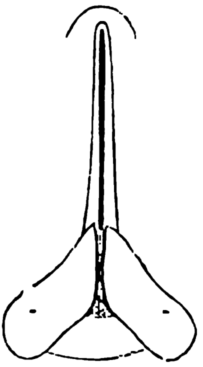
Cases of this kind are usually incurable. Certainly they are not to be remedied by local measures instituted with reference to the affection of the voice; although in many instances, as in the two cases selected for illustration, it is the loss of voice that first suggests the idea of the existence of disease of a serious character.

Dysphonia is occasionally produced by the operation of ligating the primitive carotid artery, the surgeon having included in his ligature a little nervous twig which leaves the superior laryngeal nerve just before its division into the two branches, one of which passes to the external face of the wing of the thyroid cartilage, and the other to the internal face. This twig, which often increases the thickness of the gangliform plexus of the pneumogastric, runs along the middle circumference of the primitive carotid artery, and thence sends a twig to the intercarotid plexus, which finally loses itself in the branches of that vessel. If, therefore, the voice is altered after an operation upon the primitive carotid, the surgeon can infer that he has included this twig in his ligature.

Paralysis of both cords may be peripheral or central; that is to say, it may proceed from disease of the nerve centres, in which it is, as a rule, irremediable by local measures; or it may be due to defective innervation at the points of ultimate distribution; a condition much more frequent, and one which is nearly always promptly amenable to local treatment.

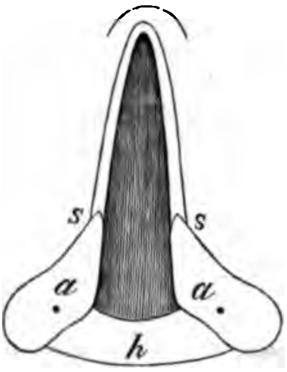
These forms of paralysis of both cords may vary in several particulars. Tobold[1] designates five forms, as illustrated in the accompanying diagrams:

Fig. 123.



Aphonia, with momentary normal closure of glottis. Also represents aphonia with normal closure, but want of vibration of one or both cords. (Tobold.)

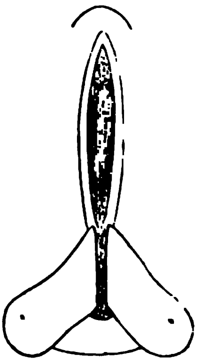
Fig. 124.



Complete paralysis of both cords. (Tobold.)

a a arytenoid cartilages; *h* posterior wall of larynx; *s s* vocal process of the arytenoid cartilages.

Fig. 125.



Paralysis of thyro-arytenoid muscles. Closure of the inter-arytenoidal space of the glottis, that portion between the vocal cords remaining open. (Tobold.)

---

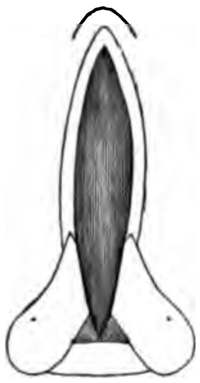
[1] Die Chronischen Kehlkopf-Krankheiten. Berlin, 1866.

Fig. 123 represents a normal closure of the glottis, with a want of innervation in the arytenoid muscles, which leads to an immediate separation posteriorly, so that the glottis assumes the form depicted in Fig. 127. This form is usually longer of cure than the others. Fig. 123 also represents normal closure of glottis, with want of vibration of one or both cords.

Fig. 124 represents the most common form, in which the vocal cords remain separated without any appearance of coming together. The paralysis is in the posterior arytenoid muscle and the thyro-arytenoids.

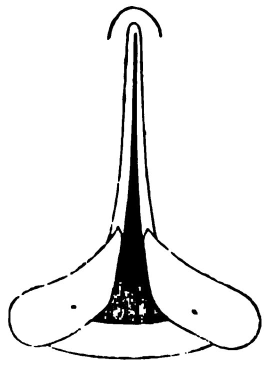
Another form of the paralysis is depicted in Fig. 125. Here the arytenoid muscles bring the arytenoids into contact, but the whole anterior portion of the glottis remains open, and aphonia results. The paralysis affects the thyro-arytenoid muscles, and in some instances the crico-thyroids also.

Fig. 126.



Elliptical opening of entire glottis. (Tobold.)

Fig. 127.



Want of approximation of the arytenoid cartilages. (Tobold.)

Still another form of paralysis of both cords is depicted in Fig. 126. Here the entire glottis has the form of an ellipse. The posterior arytenoid muscle brings these arytenoids in contact posteriorly, but they cannot rotate so that their vocal processes come in contact. There is here paralysis of the lateral crico-arytenoid muscles and of the thyro-arytenoids.

Finally, Fig. 127 represents a quite common form of paralysis, affecting the arytenoid muscle only, and perhaps its transverse fibres chiefly. This form often permits of a certain amount of phonation.

There is still another form not infrequently met with, and that is where there is a normal closure of the glottis comprised within the vocal cords, but opening behind the point of contact of the vocal processes of the arytenoid cartilages. This is due to paralysis of the arytenoid muscle only. In this variety, too, the voice is usually dysphonic only; but sometimes it is completely aphonic.

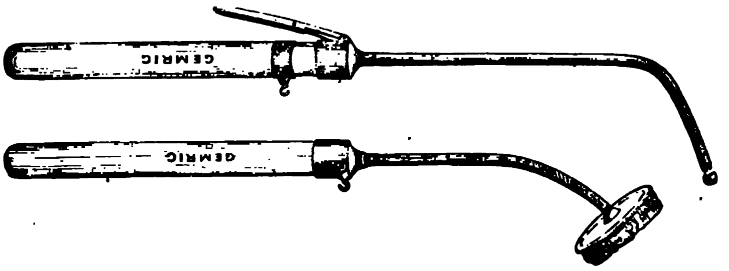
In addition to all this, there is another form of bilateral paralysis, very serious in regard to life, which consists in paralysis of the posterior crico-arytenoid muscles, preventing proper opening of the glottis, and thus threatening suffocation. It is readily recognized in the laryngoscope, and the subjective symptoms are similar to those of laryngismus stridulus. There is no aphonia, because there is no difficulty in bringing the cords together; the difficulty lies with drawing them apart. Tracheotomy is called for in this affection, which is mentioned in this connection on account of its being due to paralysis, a condition which, as a rule, affects the laryngeal muscles of contraction of the glottis, and not those of dilatation.

The cause of paralytic aphonia is sometimes involved in obscurity. A certain number of cases occur as one of the manifestations of hysteria. Others occur as reflex actions from the irritation of laryngeal, tracheal, or bronchial catarrh; the catarrh of scarlatina, measles, and small-pox; rheumatism; syphilis; scorbutis; scrofulous inflammations elsewhere; dyspepsia, from the abuse of warm drinks, and rich, greasy food; worms in the alimentary canal; displacements and other disturbances of the uterus. Not infrequently the paralysis results from overwork, or too constant use of the voice by professionals. Many of our famous opera singers have lost their voices at some time or other from this cause, the immense prices paid for their services stimulating them to sing night after night upon an illy-warmed stage during a long season. Madame Talma was known to have been compelled to quit the scenes on this account; though it is rare that the aphonia occurs during the excitement of public singing. Mental emotion sometimes produces aphonia, independently of any hysterical condition or undue nervousness. One of the cases which came under my care occurred in a married lady, intelligent, and apparently sound in mind and body, who lost her voice several years before under the following circumstances. She was residing in the country, and received an urgent message to visit her parents' home, as her father, to whom she was much attached, lay very ill. On her arrival she was met by the physician, who explained to her that her father was dying. On entering her father's room, and realizing his condition, she was unable to speak to him, though her voice had been as good as ever the moment before, and had survived the shock of the mournful intelligence. This condition had persisted for three or four years in spite of treatment.

The treatment of aphonia, or dysphonia, due to paralysis of the vocal cords, depends upon the nature of the lesion, and the constitutional condition of the patient. Paralysis of both cords, when not dependent upon lesion of the nerve centres, or upon pressure upon the nerve in some part of its course, is almost always susceptible of prompt cure, even when the aphonia has existed for many years. This is particularly the case in hysterical aphonia, but it is true also of aphonia not associated with hysteria. In many instances of hysterical aphonia the voice is lost suddenly, and as suddenly regained, it may be in a few hours, in a few days or weeks, or after several months or even years.

The cases of this kind which have occurred in the author's experience can be counted in hundreds, in many of which he has found that the voice may be readily restored by any stimulus directly applied to the glottis; most frequently by the production of spasmodic action of the vocal cords, but in some instances by the emotion produced in the mind of the individual. The methods employed for this purpose have been various, often indifferent, and sometimes selected at random for the purpose of testing the point. They have been such as inhalation of the vapors of chlorine, of iodine, of ammonia; the direct application to the glottis of cold water, tincture of iodine, nitrate of silver, etc., by means of the sponge probang; the injection of sprays of ice-water, sulphuric ether, sulphate of zinc, etc., by means of the laryngeal syringe. In quite a large number of instances, in one of which complete aphonia had existed continuously for more than four years, I have succeeded in restoring the voice by the simple introduction of the laryngeal mirror, the patient being purposely impressed with the idea that this manipulation constituted the operative procedure. In fact this is the method I adopt in cases of habitual loss of voice, and often find it instantaneously effective. Where simple introduction of the mirror does not suffice, recourse is had to some of the methods above narrated; and if these are not promptly successful, resort is made to the passage of an electric current through the parts, the negative pole being brought in contact with the vocal cords, or with the muscles at fault, and the positive pole being placed at an indifferent place upon the cutaneous surface, that is to say in the hand of the patient, or upon the neck just over the seat of the crico-thyroid membrane. This method of local electrization is exceedingly effective, and rarely fails even in obstinate cases. It was introduced into the treatment of aphonia by Dr. Mackenzie, who has devised special electrodes for the purpose, the most useful of which are illustrated in Fig. 128.

Fig. 128.



Mackenzie's laryngeal electrodes.

The upper figure represents an isolated electrode to be placed within the larynx, a bit of sponge or leather being fastened upon the exposed bulb to prevent the stinging or burning sensation that accompanies the uncovered instrument. The conducting wire from the battery is attached to a metallic ring, which encircles a glass handle; this metallic ring is brought in contact with the laryngeal portion of the instrument by pressing a metallic spring interrupter upon it. In this manner the passage of the current is controlled, and when the spring is not pressed the instrument is a simple probe or sound. The lower figure represents a sponge electrode, which is to be placed on the outside of the neck and held by the patient or an assistant. Dr. Mackenzie prefers for this purpose a sponge electrode more recently devised by him, attached to a collar which is secured round the neck of the patient, who in this way is attached to the battery by the conducting wire. The laryngeal electrode has been modified by Drs. Mackenzie, Tobold, and others, so as to branch into two divisions, one of which can be placed on each vocal cord; or one outside of the laryngeal wall and the other within. In similar manner the electrode has been made of two isolated rods, one of which is placed in connection with each pole of the battery.

In order to avoid exciting the muscles of the pharynx into contraction when employing Mackenzie's laryngeal electrode upon the pharyngeal surface of the larynx, as, for example, when placing it over the arytenoid muscle, it is well to unscrew the metallic bulb, and replace it by a thin curved plate, the convex portion of which is insulated by a layer of hard rubber. The plate being perforated, a thin strip of sponge is sewed on with silk.

Any galvanic battery, induction coil, or magneto-electric machine, may, as a rule, be used as the source of electricity, this being usually, in these cases, a matter of indifference; a fact which goes a good way to prove that it is not the electrical current in itself which produces the result, but the stimulus conveyed to the part by the electric shocks. In this way, too, we can explain the success of intra-laryngeal applications of electricity in cases where external applications fail. In cases where the electric treatment is prominently indicated, we sometimes find that the few seconds at a time during which the current can be borne within the larynx, is insufficient for securing the passage of a sufficient amount of electricity through the paralyzed parts; and under these circumstances we are often able to succeed with protracted electrization practised externally, even after the unsuccessful resort to the intra-laryngeal method. In the external method we may place one pole in front of the crico-thyroid ligament, and the other to the nape of the neck; or we may pass the current through the thyroid cartilage from side to side; or we may place one pole over the crico-thyroid membrane or at the side of the neck, and the other in the hand. We use the negative electrode at the point nearest the laryngeal muscles, endeavoring to cover them where possible; and where this is not successful we place a pointed electrode, similar to the upper one in Fig. 128, along the side of the trachea as near as possible to the course traversed by the inferior laryngeal nerve; or we may take this electrode and pass it down the œsophagus, by the side of the larynx, in order the better to act on this same nerve.

The treatment of aphonia by local electrization is to be continued every day or every other day until the voice has returned. This result will not infrequently happen at the very first application. When the voice has returned it will be prudent to continue the treatment, at gradually lengthened intervals, for two, three, or four weeks, or until the voice has gained its original strength. Four or five applications of a few seconds' duration each are made at each interview. But, even without any further treatment, the voice often remains good after it has once been restored in this way.

In certain cases relapses take place, and they are to be treated in the same way as at first. Meanwhile, attention should be paid to the general health; and such constitutional treatment be adopted as may be requisite. A salt of strychnine is particularly indicated, and forms an admirable addition to the general tonic treatment. In some cases, and perhaps in a great many of them, if it were more resorted to, it is adequate to a cure without the institution of any local measures. Injected hypodermically, in doses commencing at $\frac{1}{64}$ of a grain, and increased, the sulphate or the nitrate of strychnia will often act most happily after a few injections, repeated at intervals of three or four days. It cannot always be relied upon. I have employed it in this manner in much larger doses; and internally in doses gradually augmented to $\frac{1}{4}$ grain, three times a day, producing the characteristic constitutional effects of the drug, but without any effect upon the voice. In one case of a young lady seventeen years of age, of scrofulous diathesis, otherwise healthy, I gave this drug, first hypodermically, then internally in the doses mentioned, without any beneficial results, having previously failed with faithful resort to electricity, applied locally and externally. Finally, when the patient had been under care for about a year, the voice returned gradually under the direct influence of a galvanic current from forty small Smee cells, applied externally, with interruptions of about three hundred in the minute.

Should the aphonia arise from any of the causes narrated on p. 469, the appropriate constitutional treatment for that condition should be instituted, in addition to whatever local measures may be employed for the restoration of the voice.

Dr. Henry K. Oliver,[1] of Boston, has called attention to a method of treating aphonia from paralysis of intrinsic muscles of the larynx by external manipulation of the organ, with restoration of voice at a single sitting.

I am inclined to think that these cases belong to that class so often cured by the mere introduction of the mirror, or the recourse to other indifferent methods. The manipulation consists essentially in compressing the wings of the thyroid cartilage, in their posterior and upper part, between the thumb and forefinger. It would require considerable pressure of the wings of the cartilage to traverse the space of the pyramidal sinuses so as to approximate a pair of arytenoid cartilages—such an amount of force as might produce fracture in an unfortunate subject; while the moderate degree of approximation produced seems insufficient in itself to account for the result, without invoking the influence of emotion, or muscular resistance on the part of the laryngeal organ. However, in absence of any personal experience, it is unbecoming to pass judgment. In two or three instances in which electricity restored the voice, and in one in which it was restored by the mere introduction of the mirror, this method was tried by the author in the first place, a moderate degree of force only being employed; but without any success; and he has not cared to pursue the subject any farther. Accidental choking has sometimes cured aphonia.

---

[1] *Am. Jour. Med. Sci.*, April, 1870, p. 305.

LARYNGISMUS STRIDULUS.

This is the name given to a peculiar affection, the main symptom of which is a spasmodic contraction of the glottis, preventing the free inspiration of air; the attempt at inspiration being usually accompanied by a peculiar vocal crowing sound, to which the name stridulation has been applied, from its supposed resemblance to the stridulation of insects. The seriousness of the affection consists in the danger of suffocation during the continuance of the spasm. I am inclined to believe that the term *suffocative laryngismus* would denote the peculiar character of the affection better than any other which has been proposed.

It is purely a nervous affection, unaccompanied by any inflammation of the larynx, and should not have received the name of spasmodic croup. It is occasionally encountered in adults, but is particularly a disease of childhood, occurring usually during the period of the first dentition.

The pathology of this affection was long misunderstood, until it was shown by Dr. Marshall Hall to be usually due to the reflex action excited in the motor system of nerves by the irritation of the trifacial in dentition, the pneumogastric in nutrition, or the spinal nerves in disorders of the intestines. It occurs frequently in children of the scrofulous diathesis, especially those who are the subjects of rickets; and caries of the cervical vertebræ has in some instances been discovered after death. The pressure of an enlarged thymus gland, of an abscess, or of an enlarged bronchial gland upon some part of the course of the pneumogastric or of the spinal accessory nerve is also, at times, the cause of this affection.

The affection shows itself suddenly, usually during sleep; the child waking in fright with excessive dyspnœa, accompanied by the peculiar phonal inspiration produced by the passage of the inspiratory current through a spasmodically contracted glottis, the lips of which are set in vibration as the air is forced past them. All the symptoms of impending suffocation are present during the paroxysm, and death may take place in consequence; but usually, just as asphyxia seems imminent, the spasm relaxes, the air rushes into the windpipe with the characteristic stridor, and the paroxysm is over for the time, the entire phenomena occupying but a few moments. Sometimes but a single paroxysm occurs; but more usually others follow at intervals of a few days or a few hours, and often with increasing frequency. Sometimes the first paroxysm is the most serious one of the series, but not infrequently it is less serious than those that follow. Sometimes the paroxysms are accompanied with spasmodic contractions of the extremities, and occasionally they are followed by general convulsions. Sometimes sudden fright, or sudden excitement in play, such as is produced by tossing the child into the air, excites the first paroxysm of the affection.

The treatment during the paroxysm is directed towards relaxing spasm and thus warding off asphyxia; being such as the dashing of cold water upon the child's face, and other exposed parts of its body; exposing the surface to a current of cool air; slapping the breast, back, etc.; the patient being placed in a warm hip-bath, if the conveniences for so doing are at hand. This is usually all that can be done at the first paroxysm. For use in subsequent paroxysms, warm water should be at hand for purposes of the bath, or for the administration of an enema; or an anæsthetic, for use by inhalation.

After the paroxysm has subsided, efforts must be made to overcome the source of irritation, which may reside in the teeth, in the stomach, in the intestines, or in the brain. In addition to this, antispasmodic remedies should be employed externally and internally; with the cautious resort to narcotics, if not contra-indicated.

If the child is not strong, as is frequently the case, the use of vegetable or mineral tonics is indicated.

The gums should be attended to, the bowels kept relaxed, and great care be paid to diet, proper clothing, and equable temperature.

The absence of fever, cough, and alteration of the voice, or aphonia, in the latter stages, distinguishes this affection from croup, with which it is sometimes confounded.

Laryngismus stridulus likewise occurs in the adult, sometimes in connection with a paralytic condition of the posterior crico-arytenoid muscles, as mentioned elsewhere, page 469. Under these circumstances the rigid approximation of the vocal cords can be observed in the laryngoscopic image. The cause in the adult may be reflex action from disease of the alimentary canal or other portions of the body; or it may be of cerebral origin, or be due to pressure upon the nervous trunks; or it may be one of the manifestations of hysteria. The condition is sometimes attendant upon phthisis, as has occurred in two instances under the author's care. Where the paralytic condition referred to exists, any slight exertion, or even mental emotion, will give rise to the spasmodic action of the glottis. Rest, then, physical and mental, is an important element in the treatment of the affection. Systemic remedies suited to the peculiar condition of the organs of digestion and secretion are required, together with the use of antispasmodics, and of relaxing inhalations. Topical treatment of the larynx is inapplicable, in consequence of the danger of exciting spasm of the glottis. If the affection is persistent, and especially if laryngoscopic inspection reveals the paralytic conditions of the muscles which widen the glottis, tracheotomy is indicated as a means of avoiding the liability to suffocation; and it becomes imperatively demanded if there are any evidences of inflammatory action, inasmuch as a moderate swelling, which would be of no moment under ordinary circumstances, would here render respiration impossible.

If the condition should continue after the performance of tracheotomy, the local application of the electric current to the affected muscles would hold out reasonable prospects of cure. Should this fail, the opening in the trachea would have to be kept patulous until the condition subsided spontaneously, or through the influence of a general tonic treatment.

A condition somewhat similar to that just narrated may arise from spasm of the trachea, and would be distinguished from spasm of the larynx by the use of the laryngoscope as a means of diagnosis. This is inferred from the following note quoted from Porter.[1]

---

[1] **Observations on the Surgical Pathology of the Larynx and Trachea, by William Henry Porter, A.M. London, 1837, p. 18, note.**

"In opposition to the idea of spasm only occurring in situations that admit of being acted on by muscular contraction, there is a case related in the 11th vol. of the *Edin. Med. and Surg. Journal*, the dissection of which showed a contraction of the trachea to more than two-thirds of its diameter, and one inch and a half in length, situated midway between the larynx and the bifurcation of the trachea. The contraction relaxed gradually after the tube was slit, so that, the day following, the part did not appear contracted, or in a state of disease of any kind."

SPASMODIC COUGH.

A very curious nervous affection of the larynx now and then encountered is that of a peculiar spasmodic cough, occurring without the existence of any appreciable lesion. It is most frequently met with in females, and is usually attributable to hysteria. I have met cases of this kind in married as well as in unmarried women, and in males as well as in females. The cough usually has some characteristic tone about it, such as that of the cry of one of the lower animals; the yelping as of a little cur being the sound most frequently met with. Paroxysms of cough will come on more or less frequently at irregular intervals of about five or ten minutes, half an hour or longer, and continue for two, three, five, or more minutes at a time, the characteristic sound of the cough being repeated fifty or sixty times a minute. In one remarkable case of this kind under the author's care, a few years ago, the sound of the cough might be represented by the syllables "ha, hich," the latter syllable having the Greek or Teutonic sound, and being given at a pitch a fourth higher than that of the first one. The subject of this affection was the daughter of a clergyman. In another subject, also the daughter of a clergyman, the sound was so much like that of a little poodle, that patients in the reception-room during the time of her visit would ask each other, "Why, that lady hadn't sense enough to leave her dog in her carriage." This character of cough I have met with in other cases also. Some twenty years ago, a lady's boarding-school in Philadelphia was broken up in consequence of an hysterical spasmodic cough of this kind breaking out among the scholars, a number of whom became affected with it one after the other. The people in the neighborhood, hearing of it, were wont to collect in front of the school-house to hear the girls bark; and this only made matters worse, so that finally the school had to be temporarily dismissed, and the girls sent home to their various residences.

I have had under my care three cases of spasmodic cough occurring in three brothers over forty years of age, a fourth and older brother being similarly affected; the cough having continued in each case from fifteen to twenty-five or more years. The father of these four brothers was subject to similar cough from his boyhood until he had become over seventy years of age, since which time, a period of more than ten years, he has not had this cough. The sisters of these gentlemen have never been affected with the cough. The father and three of the sons are regular physicians in good standing. The three cases referred to I examined laryngoscopically. The larynx was very much congested in each case, but I could see no cause for the trouble, unless it existed in the possession of a very large epiglottis. The gentleman having the largest epiglottis informed me that he was subject to suffocative spasms at the dinner-table, in one or two of which he has become unconscious, but has been brought to by his wife, who places her fingers back in his throat. Two of the brothers have had several similar spells also, though they recovered without the interference of a second person. I feel inclined to the opinion that the epiglottis of these gentlemen sometimes becomes impacted into the larynx in deglutition, thus producing the spasm of suffocation; a condition which I have known to occur repeatedly in a young child who was subject to suffocative paroxysms, in whom I detected a large epiglottis as the cause of the paroxysms, and whose mother I taught the method of relief by running her finger down beneath the epiglottis and pulling it up. This little fellow was also subject to spasmodic cough. A similar cause excites spasmodic cough every night in a little child under treatment at the moment of writing.

In another case of a lady of Philadelphia who had been married for twenty-eight years, and who had been a subject of spasmodic cough for more than twenty years, I found an epiglottis quite deeply indented in the centre of its free edge, its lateral portions projecting so much beyond the depressed portion as to give it somewhat the appearance of a fissure. The laryngeal face of the epiglottis was red and very velvety in appearance.

The treatment of cases of this kind is very perplexing. Antispasmodic remedies avail at one time and are useless at others. The general health, when impaired, and this is frequently the case, must be attended to; and in females, any irregularity of menstruation, or other uterine difficulty, is to be corrected. Locally, I have found anodyne inhalations to moderate the intensity and frequency of the cough. This may also be accomplished at times by the internal use of belladonna, bromide of potassium, arsenite of potassa, or other remedies addressed to the nervous system. Sometimes, the use of strychnia, internally, controls the cough. In one of the cases of the brothers just mentioned, I found good results follow the local application of tincture of aconite root to the epiglottis, followed immediately by a saturated solution of tannin in glycerine. This relieved the cough from the first, and for some considerable time the gentleman has had a great deal of reduction in the frequency and intensity of the paroxysm; and at a very recent interview he stated that his cough had lost its peculiar shrill, unpleasant sound, and seems more like the chronic cough frequently met with in elderly people.

In one or two instances I found good results from the local employment of electricity; but I am not prepared to deny that the emotional influence of the manipulations was not without a calming effect. In these applications I employed the positive pole of an apparatus of induction within the larynx, and the negative pole by large electrodes to the naked feet. After employing it in this manner for a few moments, the positive pole was shifted to the exterior of the larynx, the operator's hand being employed as electrode. During the applications of the current the cough ceased, and would often remain controlled for hours at a time, occurring less and less frequently, and in shorter paroxysms, with perhaps but one or two characteristic barks at a time instead of fifty to sixty in rapid succession, and so on, gradually diminishing in frequency and intensity, until the attacks ceased altogether.

At other times, I have resorted effectually to the continuous galvanic current from ten to fifteen or twenty elements, an elongated electrode connected with the positive pole being placed over the region of the sympathetic nerve in the neck, on each side alternately, a few minutes at a time, and the other electrode being held in the hand of the same side. In one instance, occurring in a lad of eleven years of age, the son of a medical gentleman, a single application of this kind seems to have controlled the spasmodic cough at once and permanently, though it had existed for several months, and was very severe in character. Applications of this kind must be made with great care, and be discontinued immediately upon the occurrence of any unpleasant sensations in the part, in the chest, or in the head. Each application should continue for thirty seconds to three or four minutes only, according to the susceptibilities and tolerance of the patient.

A spasmodic cough, of less intensity, sometimes occurs in affections of the ear, the influence being conveyed, probably, through the chorda tympani nerve. Consequently in cases of obstinate cough, without sufficient cause for it appearing in the throat, the condition of the organs of audition should be carefully examined into. Inasmuch as affections of the epiglottis, such as œdema, ulceration, etc., are sometimes accompanied by severe pain in the ears, pain to which the local suffering at the seat of disease is as nothing in comparison, it is likely that a reverse influence produces an irritability of the epiglottis or of the glottis itself, in cases of affections of the ear or of the Eustachian tube, to the pharyngeal portion of which the larynx is in direct communication by one of the divisions of the pharyngo-palatine muscle. The cause of the ear-cough being recognized, the treatment will of course be directed to that cause.

The laryngoscopic appearance of the glottis in the production of spasmodic cough is very peculiar. The cords are seen to come together as though driven with great force from the exterior, and then suddenly to separate as the peculiar sound of the cough is made. I have thus watched the action of the parts over and over again during the entire paroxysm of a barking cough, without in the slightest way embarrassing the patient, or the cough either. Occasionally I have found that a forced expiration or a forced inspiration would break the spasm for a moment; and under these circumstances the patient is enabled to control the paroxysm, a matter of a great deal of moment as permitting re-entrance into society, itself beneficial therapeutically as a mental or emotional tonic. There is little evidence of local trouble in the larynx, but usually an intense injection of the mucous membrane covering the cartilaginous corpuscles of Santorini, and very often a similar condition on the laryngeal face of the epiglottis, and sometimes, again, congestion of the entire larynx; these appearances being the result of the constant cough, in all probability, and not its cause.

WHOOPING-COUGH.

Whooping-cough, technically known as pertussis, is a very curious affection of the upper air-passage, the pathology of which is not well understood, despite the great frequency of its occurrence. That it is a specific, contagious affection, attacking the individual but once, as a rule, all observers admit. It has been considered a specific catarrhal bronchitis by some, a specific fever by others, and by others, again, as essentially a special neurosis, or spasmodic affection of the air-passages. The characteristic symptoms of the disease are catarrhal inflammation of the upper air-passages, fever to a greater degree than can be accounted for by the intensity of the inflammation, and a characteristic expiratory spasm of the glottis attended with a peculiar cough.

For a long time the opinion has been gaining ground that this disease is due to the contact of some special organism which, in exciting the disease, exhausts the excitability of the system to the influence of the poison. It is hard to understand the immunity from subsequent attacks in this and other affections attributed to such causes. It is hard to believe that there are a number of certain elements in the blood capable of being renewed, in the cycle of waste and repair, only until they have been used up by this, that, and the other contagious disease. Yet, we cannot well account for immunity to subsequent exposure on any other ground. Linnæus considered the external organism of whooping cough an animalcular insect; so too, in part, did Rosen, though, with Bohme and others, he also considered that it might be of miasmatic origin. Recent observers have developed this theory still further, and some of them claim to have detected the offending bodies. M. Poulet took advantage of an epidemic in his neighborhood to examine the breath of many children affected with the disease, and stated in a communication to the Parisian Academy of Science[1] that, on microscopic examination of the vapor of the breath, collected by him, he found a world of minute infusoria, which were in all cases identical. The most numerous, as well as the most minute, belonged to a species known as Monas termo, or as Bacterium termo; while he also found, in smaller numbers, another species, the Monas punctum of Müller, Bodo punctum of Ehrenberg, classed among the bacteria. Letzerich[2] claims to have discovered the "piltz" or fungus of whooping-cough. He states that, in the catarrhal stage of the disease, the sputa contain small roundish or elliptical reddish-brown spores which subsequently develop filaments rapidly. In the second stage of the disease these filaments are found matted together, and bearing small round spores at their extremity. These germs, unlike the germs found in diphtheria, do not penetrate the epithelial cells of the mucous membrane, but the mucus corpuscles are often filled with them.

Whooping-cough is eminently an affection of childhood, but sometimes appears in the adult.

The initial symptoms are essentially those of coryza, with the addition, in some instances, of the symptoms of bronchitis. The cough soon becomes more violent than that of ordinary coryza, and its paroxysms more persistent; and in the course of two or three days in some cases, though not until two or three weeks in others, the cough becomes distinctly paroxysmal. It is then that the peculiar whoop is produced which has given its name to the affection. The cough occurs in paroxysms of a number of successive sonorous expiratory efforts, apparently without any attempt at inspiration, continuing often until a veritable asphyxia is impending, the number of coughs varying from six to twenty or more at each paroxysm. Finally a deep and labored inspiration is drawn into the exhausted lungs, the air passing a spasmodically contracted glottis and thus giving rise to that peculiar stridulous sound which is denominated the whoop. Then follows another succession of coughs, succeeded by the shrill whooping inspiration; and this is repeated again and again, the entire series constituting a paroxysm which may last from half a minute to fifteen minutes or more. During the paroxysm there is dyspnœa, impeded circulation of the blood and its consequences, flushed and livid face, distention of the cervical and temporal veins, protrusion of the eyeballs, suffusion of tears, etc.; these symptoms being proportionate in severity to the severity of the paroxysm. Sometimes the paroxysms are exceedingly violent, attended with hemorrhage from the nose and mouth, even from the ears and from other localities; and sometimes there occur involuntary passages of urine and fæces. Dilatation or rupture of the air-vesicles sometimes results from the violence of the paroxysm, giving rise to emphysema. The paroxysm usually terminates with an expectoration of mucus, and sometimes with vomiting; the relaxation of the spasm, in some instances, seeming to be due to the emesis as a cause.

---

[1] (*Gaz. Hebd.* Aug. 16, 1867) *Am. Jour. Med. Sci.* April, 1868. p. 531.

[2] (*Virchow's Archiv.* March) *The Med. Times*, Jan. 2, 1871. p. 125.

The paroxysms recur irregularly, and often without special exciting cause. They are often brought on by the opening of a door, by emotion, by the act of swallowing, and by witnessing, or merely hearing the paroxysm in another, etc. There may be only a few paroxysms in the twenty-four hours, or there may be many, amounting, in some instances, to as many as a hundred, it is said. The paroxysms are sometimes more frequent at night and sometimes more frequent in the day-time. The frequency and violence of the paroxysms usually increase for four or five weeks, sometimes not so long; then there seems to be no change for a few days or for two or three weeks, after which their violence and frequence decline. The average duration of whooping-cough is perhaps about nine weeks;—and waiting nine weeks often constitutes the best treatment. Many cases terminate sooner, and many are prolonged longer; and in a few instances the affection has been asserted to have continued longer than a year.

Whooping-cough in itself is not dangerous to life, but may become so in consequence of the complications which arise from the state of constitution, or the effects of the paroxysm. It is not infrequently associated with measles in the same individual.

The treatment that has been adopted for whooping-cough is very various, the remedies having being addressed to the nervous system, the circulatory, or the respiratory system, separately, or in connection. Thus assafœtida, musk, valerian, belladonna, recently bromide of potassium, etc., form integral elements of the treatment. Of late inhalations have been freely employed in the management of whooping-cough, as has been fully treated of by the author elsewhere.[1] Remarkably beneficial effects seem to attend the employment of the vapor of illuminating gas just after its subjection to the purifying process. This method has been employed with success at Amsterdam, Calais, Paris, Vienna, and other places; and I have been informed by some of my professional friends that it has been tried with success in Philadelphia. About twelve visits to the gas-works are required, the duration of each visit being about two hours. The use of benzine or of carbolic acid sprinkled about the pillow, or placed in shallow vessels, has been employed as a home-substitute for this treatment. The use of sulphurous vapors, nitrous vapors, turpentine vapors, and the sprays of various solutions have also been highly spoken of. The value of many of these articles would seem to depend upon their anti-zymotic influence. Dr. Snow, of Providence, R. I., has suggested[2] the use of the carbolate of lime placed in saucers about the room in which the child is sleeping, merely sufficient to impregnate the apartment with the odor from it. Binz[3] extols the use of the hydrochlorate of quinia, one part to one hundred. Mr. John Grantham recommends[4] the use at bedtime of the vapor of ammonia, evolved from an ounce of the strong solution thrown in an open vessel containing a gallon of boiling water kept hot by a red-hot half brick.

---

[1] Inhalation; its Therapeutics and Practice. Phil. 1867. pp. 144, 216 *et seq.*

[2] *The Medical Record*, Vol. 3, p. 513.

[3] *Practitioner*, Nov. 1869, p. 304.

[4] *Brit. Med. Jour.*, Sept. 16, 1871, p. 323.

The local use of nitrate of silver has been highly recommended in whooping-cough by Drs. Eben Watson,[1] Pearce, Gibb,[2] and others. It is employed in the early or catarrhal stage, and, it is claimed, with an abortive, or at least greatly shortening result. Dr. Rohn, of Hanau, was led[3] to the employment of inhalations of this substance in solution, from the laryngoscopic appearances exhibited by adults and children while suffering from the complaint. He found the upper portion of the trachea and the lower portion of the larynx markedly congested, causing the vocal cords to appear whiter than they really were from the contrast; and he states that adults and larger children complained of severe irritation of a peculiar character at this point, just before the onset of the spasm of coughing.

WOUNDS OF THE LARYNX AND TRACHEA.

Wounds of the larynx and trachea are met with, occasionally as the result of accident, sometimes of attempts at murder, but most frequently as the result of suicidal mutilation. Through ignorance of the anatomy of the parts, coupled with the notion that a wound in the windpipe must of necessity be fatal, these attempts fail in producing death oftener than they succeed. The reason that so many of these suicidal attempts are unsuccessful is, that the subject bends his head backwards, a movement which has a tendency to press the large vessels back out of the way of the knife. A knife of some kind, or some substitute for it, as the handle of a spoon sharpened upon a stone, is usually employed for suicidal purposes; and the devices resorted to by the insane, and by individuals incarcerated for penal offence, are sometimes very ingenious. When death occurs under these circumstances it is usually very rapid, resulting from the hemorrhage from the great vessels of the neck, and not from the injury to the air-passage. The larynx is said to be the usual seat of this wound, but the trachea seems to be severed as often; for Sabatier's list[1] gives the larynx as the seat of injury in twenty-three instances, and the trachea in twenty-two. The seat of injury concerned the hyo-thyroid membrane in twelve cases, the thyroid cartilage in ten, the crico-thyroid membrane in thirteen, the crico-tracheal membrane in one, and the trachea in twenty-two cases. Wounds of the epiglottis, which sometimes occur, are not mentioned in the list referred to.

---

[1] (*Association Med. Jour.*, August 16, 1853) *Am. Jour. Med. Sci.*, Oct. 1853, p. 491.

[2] On Diseases of the Throat and Windpipe. 2d edit., p. 291.

[3] *Wien. Med. Woch.* xvi. 1866, pp. 52, 53; Schmidt's *Jahrb.*, Nov. 1866, p. 57. Cohen; On Inhalation, etc., p. 145.

In the treatment of cases of this kind it is recommended that the surgeon be not too assiduous in closing the external wound, as there is danger of hemorrhage when reaction comes on, on account of the extent of tissue usually severed. It is best to await reaction, and, if hemorrhage occurs, to ligate the bleeding vessels, or arrest the bleeding by styptics, as the case may require, the parts being brought together lightly by adhesive strips, and not closed by suture until all danger of this kind is at an end. During the treatment the head should be brought down upon the neck by appropriate bandages, so as to secure apposition of the transverse wound. If symptoms of suffocation occur, the trachea must be opened.

During the healing of these wounds, contraction is very apt to occur, necessitating the permanent use of the tracheotomy tube. These constrictions have been overcome in a few instances by Prof. Liston and others; the method employed being that of gradual dilatation. In one instance of this kind I was enabled to relieve the patient from the necessity of wearing a tube, dilatation being produced in the contracted glottis (the wound having been directly below the vocal cords) by the frequent passage of large perforated catheters through the wound up into the mouth, and the seesawing of these instruments, up and down, by means of the two hands.

FRACTURES OF THE LARYNX AND TRACHEA.

Fracture of the Larynx.—Fractures of the larynx occasionally take place as the result of mechanical injury, sometimes in connection with simultaneous fracture of the hyoid bone, but oftener without this complication.

---

[1] Hourteloup: Plaies du larynx, de la trachée et de l'œsophage. Paris, 1869, p. 16.

Usually only the thyroid and cricoid cartilages suffer fracture. The arytenoid cartilages, on account of their mobility upon the cricoid, escape fracture, and are more apt to suffer dislocation. In many cases both thyroid and cricoid cartilages are broken; but when the accident is confined to one cartilage, it is the thyroid which is most frequently fractured. These fractures are sometimes single, and sometimes multiple.

In 46 cases of fractures of the larynx and trachea collected by Gürlt,[1] 16 cases occurred in persons from nine years of age to thirty, 12 in males and 4 in females; which may not represent the proper proportion, inasmuch as in a number of these cases the age of the patient is not mentioned in the original report. It will thus be seen that ossification of the cartilages is not as important an element in this form of injury as it is usually supposed to be. In these 16 cases, in 6 the thyroid cartilage alone was affected, in 2 the "larynx" without designating what portion, in 1 the cricoid alone, in 1 the trachea alone.

The most frequent cause of fracture is a murderous attempt at choking with the hand, whether premeditated or performed during the excitement of a scuffle. A blow upon the anterior portion of the throat with the fist, or with some hard substance, as a billet of wood, is also a source of fracture. Sometimes the cause is purely accidental, as a fall in which the neck strikes upon a hard substance. Occasionally, it is said, it is produced in awkward hanging. The work of Gürlt, already referred to, in which more cases are brought together than in any other work that I have been able to procure; as well as the cases given by Gibb,[2] show the general nature of the accident, its course and termination. A few isolated cases are given here and there in the medical journals; but their results do not vary essentially from those summed up by Gürlt, Gibb, Fredet,[3] and Hunt.[4]

The symptoms attending a fracture of the larynx, varying of course with the nature and extent of the lesion, will be as follows: At first a spasmodic cough, sometimes preceded by spitting of frothy blood, and very soon severe dyspnœa with all its accompaniments of cyanosis, coldness of skin, smallness of pulse, frequent and labored respiration, with large mucous larnygeal rales, hoarseness of voice or even aphonia; and sometimes an inability to speak at all, a few inarticulate tones being forced out in the attempt; more or less painful swallowing; and in all severe cases attended with rupture of the mucous membrane, there will ensue an emphysema of the throat and neck extending steadily over the face, the cervical vertebræ, down into the mediastinum, and sometimes over the entire body. This emphysema is said to be more apt to take place in the intermuscular than in the subcutaneous connective tissue. Cases occur, but exceptionally, in which the symptoms will not be at all of a serious character; perhaps merely soreness and some hoarseness of voice. Manipulation of the parts, however, affords the evidence of fracture, but it is likely, in these instances, that the internal mucous membrane has not suffered laceration. In severe cases there will be more or less deformity from over-riding of the fragments. Cartilaginous crepitation will also be elicited on moving the fragments one upon the other; but care must be taken not to mistake for this the crepitation which can be produced in the normal larynx by lateral movements, or by slight pressure against the vertebræ.

---

[1] Handbuch der Lehre von den Knochenbrüchen: Dr. Gürlt. Hamm, 1864. Theil 11. Lief 1.

[2] On Diseases of the Throat and Windpipe.

[3] Quelques considérations sur les fractures traumatiques du larynx. Paris, 1868.

[4] Fractures of Larynx and Ruptures of Trachea. *Am. Jour. Med. Sci.*, April, 1866, p. 378.

It is also to be remembered, in this connection, that the upper horn of the thyroid cartilage is occasionally found disconnected from the body of the cartilage, and enclosed in the lateral thyro-hyoid ligament. Luschka[1] found this condition in three instances; the anomaly existing on the left side only, in each case. It would therefore appear that this process is a sort of epiphysis; and the anomaly in question is well to be remembered, as it might be mistaken under certain circumstances for a fracture, the result of mechanical injury.

Severe cases of fracture of the larynx often terminate fatally at once, or within a short period after the receipt of the injury.

---

[1] Virchow's *Archiv.* March 18, 1868, p. 478.

Should the patient survive the immediate injury, and symptoms of dyspnœa present themselves, an opening should be promptly made into the air-passage below the seat of injury, without waiting for the effects of antiphlogistic treatment. Even in cases that do not present any great severity of symptoms at first, an operation of this kind may become necessary on account of the production of œdema. The patient should be placed at perfect rest, and the case be treated on general principles.

The displaced fragments should be replaced with the greatest care; and in some instances the performance of laryngotomy, which can add but little to the danger of the case, will afford a better means of reposing the fragments by means of probes or catheters placed within the larynx through the artificial opening. The fragments should be merely replaced, without any attempt to retain them in position by suture, inasmuch as the results of experience teach that the cartilage is very intolerant of the presence of sutures, which soon cut their way out, if the symptoms they produce do not render their removal necessary. The wounds in the soft parts may be approximated by adhesive strips and sutures, care being taken to leave an opening below sufficient for drainage, keeping it patulous, if need be, by a shred of lint, inasmuch as these wounds heal by suppuration, and rarely by first intention.

The insertion of a canule in the artificial opening is usually required; and in many instances its permanent use cannot be dispensed with even after recovery from an operation. Sometimes a fistule remains; and this can be covered up by a plastic operation externally.

A very instructive case is here quoted from the monograph of Fredet,[1] illustrating the nature of the injury, and mode of treatment; and showing the necessity that exists for performing laryngotomy or tracheotomy after accidents of this kind:—

"*Triple fracture of cricoid cartilage produced by compression between the fingers—sudden death upon an abrupt movement of the patient.* April 5th, 1867, in a quarrel, the Sieur

---

[1] Quelques considérations sur les fractures traumatiques du larynx. Paris, 1868, p. 5.

L . . ., aged 30 years, was seized by the throat by one of his adversaries, a strong and vigorous man, who, after having thrown him to the ground, held him some instants in this position, with his hand applied to the anterior portion of the neck. Seeing that L . . . could not rise, that he made the attempt to speak without being able to pronounce a word, and that his face was congested, the spectators of the struggle conveyed the wounded man to his residence, situated at some kilomètres distant from the place of combat. April 6th, Prof. Dr. Gagnon was called in attendance, and observed the following phenomena: Extreme dyspnœa; cyanosis of face; slight ecchymoses, more pronounced on the right side, upon the lateral portions of the neck, from the vicinity of the internal border of the sterno-mastoid to its middle portion, at a point corresponding to the inferior portion of the larynx; the anterior portion of the neck, as far as the pre-sternal region, was infiltrated with air in its sub-cutaneous cellular tissue; slight pressure with the fingers on these parts produced the peculiar crepitation of emphysema. There was none of the characteristic crepitation produced by the rubbing together of the fractured fragments.

"The repeated application of leeches was ordered, and under the influence of the sanguineous flow, the tumefaction of this region had almost completely disappeared, respiration was less embarrassed; and the patient, who had been unable to articulate a sound since the accident, commenced to make himself understood on the evening of April 7th. Some hopes were then entertained of a favorable issue to his injury, and the operation of tracheotomy, which had been contemplated, was deferred, when, during the night, the patient, after satisfying a call of nature and remounting his bed, died suddenly.

"*Autopsy*, April 10, at Hôtel Dieu de Clermont.—No effusion of blood encountered in the dissection of the supra and subhyoid regions. The thyroid body was normal, but the thyrohyoid muscle of the right side was infiltrated with blood. The larynx was removed by a double section; one practised at the base of the tongue, and the other comprising a portion of the trachea. After a careful dissection, there was revealed a triple fracture of the cricoid cartilage. The first and most considerable one was situated behind and on the middle portion of the cartilage; it was vertical, with edges as sharp as if made by a cutting instrument; it occupied the entire extent of the cartilage and joined the section made with the scissors at the posterior portion of the trachea. The two other fractures were situated right and left, in front of and upon the lateral portions of the cartilage; they were oblique from above downwards and from before backwards, with a depression in front of each side produced by the over-riding of the posterior fragment.

"The left arytenoid cartilage presented an incomplete luxation, and was in a plane anterior to the posterior border of the cricoid cartilage. The transverse arytenoid muscle was infiltrated with a sanguinolent serum.

"The examination of the interior of the larynx showed the existence of a very considerable œdema of the glottis, of the aryteno-glottic ligaments, the vocal cords, and the epiglottis. The left ventricle of the larynx was completely effaced, and the entire mucous membrane of the larynx strongly injected.

"The lungs were of a violaceous color, with numerous subpleural ecchymoses. There was but slight crepitation of the inferior portion of the lungs. Incisions made into the pulmonary parenchyma gave escape to a large quantity of very black blood.

"No lesion in the heart; its cavities were empty.

"The liver was very much hypertrophied and strongly congested; there was considerable escape of black blood on cutting into it.

"The sudden death in this instance seemed to have been the result of the sudden displacement of a fragment of the cricoid cartilage and the corresponding arytenoid cartilage, which in the movement made by the patient had over-ridden the other, making an immediate obstacle to the passage of atmospheric air, and producing death by asphyxia."

Several cases of a similar character are on record, in which death occurred during the course of treatment, and in which it is likely that a successful result would have been obtained, had an artificial opening into the air-passages formed an integral part of the early treatment.

Fracture of the Tracheal Cartilages.—Fracture of the cartilages of the trachea occurs under the same circumstances as fracture of the larynx, sometimes without simultaneous fracture of the larynx or hyoid bone, but oftener in connection with a similar injury to these organs. Gürlt gives nine cases of fracture of the tracheal cartilage, in four of which the fracture involved the trachea alone, while in the other five it was combined with fracture of the hyoid bone and larynx. His principal remarks are:—

"The causes of the isolated fracture of the trachea were: direct violence to the throat by pressure of a solid body, such as a wagon, the buffer of a railroad-car, blows upon the throat with the fist or with a foreign body.

"The general symptoms are very similar to those of fracture of the larynx, with which it is so often associated—severe dyspnœa and rapidly extending emphysema; but the local symptoms are much more difficult to distinguish, for there is no palpation of the dislocated fragments, no abnormal mobility or crepitation; the latter symptom is easier rendered in the presence of extravasation of blood or emphysema.

"The diagnosis, therefore, is difficult as far as regards the nature and seat of the injury, though it can generally be made out from the general symptoms, and by exclusion.

"The prognosis of the injury is unfavorable, as it is in severe injuries of the larynx; and the accident leads without abatement to rapid death, although, in a few cases, life may be saved by prompt operative interference. Of seven cases collected by Gürlt, in five of them death followed in 1½, 3, 12 hours, and on the day following that of the accident. In one only, in a patient apparently dead at the time, was life saved by tracheotomy, followed by the removal of masses of blood and mucus that had accumulated in the air-passages, and by the institution of artificial respiration.

"The treatment must be similar to that adopted in fracture of the larynx, and consists principally in promptly laying the wounded part freely open, when its anatomical position permits it, and especially in extensive transversal laceration of the trachea, and the consequently possible dislocation of both fragments, which may interrupt or compromise the access of the atmosphere to the lungs, a circumstance under which life can continue for a very short time only.

"Although no observations of the kind have been made, it is likely that the free laying open of the torn trachea will secure the passage of the air to the lungs, and avoid the most imminent danger to life. Recovery would then take place in the same manner as it would after a horizontal section of the trachea made in an attempt at suicide. Union of the wound by suture is to be avoided, and union by suppurative inflammation to be awaited, union being promoted by a proper position given to the head."

Rupture of the Trachea.—In addition to fracture of its cartilages, and sometimes independently of it, the trachea is liable to undergo laceration as the result of accident or personal injury, a rupture taking place either between two of its rings, or between its upper ring and the larynx. Dyspnœa and emphysema of the neck are the main diagnostic symptoms. Several instances of rupture of the trachea are on record, most of which terminated fatally. In one instance recorded by Dr. Lauenstein,[1] the patient made a good recovery from a rupture of the trachea resulting from the kick of a horse; the only symptoms remaining being a croup-like cough, pain on pressure, and dyspnœa on attempt at motion. Mr. Long,[2] of Liverpool, relates a case in which the windpipe of a laboring man was completely torn from the larynx by his being caught round the neck by the coupling irons connecting two railway carriages. On the fifth day tracheotomy became necessary, which saved the patient's life. During the operation it became apparent that the trachea had become separated from the larynx for the distance of about two inches. The tracheotomy tube was removed on the ninth day. Prof. Gross,[3] gives a case occurring to Dr. Thomas Marshall, of Va., of spontaneous laceration of the trachea, through desperate inspiratory efforts of the patient to relieve the dyspnœa caused by the pressure of a large thoracic aneurism. An instance is noticed by Beck,[1] of a boy whose trachea was totally divided by getting his throat jammed against a post in a coal-pit. Bredschnider[2] records the case of a male infant, æt. 1¾ years, who had become very unmanageable during an attack of bronchitis, and tossed his head about in a very powerful manner, inducing a comatose condition that gradually increased; on the fifth day an emphysema began under the cricoid cartilage, and rapidly extended itself on both sides. The air was afforded egress by incision. The autopsy showed a small slit beneath the first cartilaginous ring, stretching from the right side to its middle. Dr. John L. Atlee,[3] of Lancaster, Pa., relates a case from a fall, occurring in a boy four years of age. Ryland[4] mentions a case recorded by Dr. O'Brien in 18th vol. of the *Edinb. Med. and Surg. Jour.* of a woman who had been kicked under the jaw. She died, and on post-mortem examination a rupture was found extending from a similar injury of the thyroid and cricoid cartilages of the larynx, through the right side of the first ring of the trachea. Dr. Robertson,[5] of Wiesbaden, records a case of complete rupture of the trachea from the larynx, occurring in the person of a Prussian artillerist, injured by the kick of a horse. The laryngeal cartilages were uninjured.

---

[1] *Am. Jour. Med. Sci.*, Oct., 1871, p. 561, (from *Centralblatt f. d. Med. Wiss.*, Dec. 17, 1870.)

[2] *Med. Times*, July 26, 1856.

[3] Pathological Anatomy.

Contusions of the Larynx and Trachea.—Contusions of the larynx or trachea are sometimes produced as the result of accident or external violence. They are not usually very serious in their nature. Their treatment would consist in rest of the parts, soothing applications externally and careful watching. Dr. Le Gros Clark[6] records a case of contusion from a blow, which produced pain on motion of the parts, and pain on swallowing. There was also complete aphonia. There was no blood in the sputa. The voice began to return in ten days, and the patient was well in three weeks.

---

[1] Medical Jurisprudence, 1st. Ed. p. 718.

[2] (Casper's *Wochenschrift fur die gesammte Heilkunde*, 1842, p. 461.) Gürlt, op. cit., p. 336.

[3] *Am. Jour. Med. Sci.*, Jan., 1858, p. 120.

[4] A Treatise on the Diseases and Injuries of the Larynx and Trachea. Phila. Ed., 1838, p. 177.

[5] *Lancet*, Sept. 6, 1856.

[6] Lectures on Surgery, 1870, p. 229.

A contusion of the larynx may produce spasm of the glottis, threatening suffocation, and thus rendering the operation of laryngotomy or tracheotomy necessary. Contusions in this region are sometimes attended with severe injury to the soft parts. Dr. Louis Stromeyer[1] states that he has seen, after an accident of this kind, a spasmodic retraction of the muscles of the neck lasting for several days, so that the head was bent backwards as in opisthotonos, and could hardly be moved. Rest and suitable outward applications quieted the condition, and the patient recovered without any untoward symptoms.

ARTIFICIAL OPENINGS INTO THE LARYNX AND TRACHEA.

A necessity arises, not infrequently, for making an artificial opening into the air-passages, for the purpose of securing free access of air to the lungs in cases of impending or actual suffocation.

Such a necessity may arise from the presence of a foreign body in the larynx, trachea, or bronchi; in acute laryngitis, whether idiopathic or traumatic; in œdema of the larynx; in glossitis, tonsillitis, and retro-pharyngeal abscess; in croup and diphtheria; in fracture and other wounds of the larynx, or rupture of the trachea; in neoplasms in the larynx or trachea; in large neoplasms or impacted foreign bodies in the pharynx or œsophagus; in tumors outside of the air tube but pressing injuriously upon it; in ulceration and necrosis of the cartilages in tuberculosis and syphilis; in contractions of the caliber of the larynx or trachea the result of cicatrization; in asphyxia; and occasionally in laryngismus stridulus, in spasm of the glottis in epilepsy and tetanus, and in certain cases of aneurism of the aorta.

The indications for such procedure under the circumstances enumerated are given under their respective heads. In the present place we have to speak of the operation itself, and its consequences.

Three operations are performed to secure an artificial opening into the air-passages, and they are usually described under the caption of bronchotomy, a term to which we shall not again refer in this connection. These operations are laryngotomy, partial or complete; laryngo-tracheotomy, and tracheotomy.

---

[1] Verletzungen und chirurgische Krankheiten des Halsgegend, 1865, p. 309.

Laryngotomy is usually confined to making an opening in the crico-thyroid membrane in acute cases, where an artificial opening is required for a short time only. Such cases are acute laryngitis; œdema of the larynx; fracture of the larynx; the safe removal of an extensive neoplasm under laryngoscopic manipulation; the extraction of small foreign bodies from the larynx when their position has been determined by the laryngoscope or otherwise.

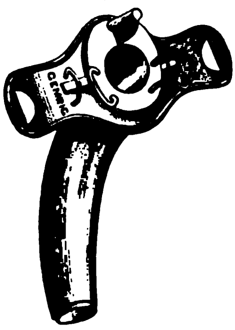
This operation is usually performed upon adults only. For the removal of large foreign bodies, or large neoplasms from the larynx, and in certain cases of extensive traumatic injury, it is sometimes necessary to lay open the entire larynx; and sometimes to divide the thyroid cartilage merely. This latter operation is called thyrotomy. There is still another form of laryngotomy, which has been occasionally resorted to in cases of foreign growths in the larynx, and this consists in a transverse entrance known as sub-hyoidean laryngotomy.

When the cricoid cartilage and one or more rings of the trachea are involved in the artificial opening, the operation is known as laryngo-tracheotomy.

When the trachea alone is opened, the operation is known as tracheotomy.

The opening being made, it is often necessary to maintain it in a patulous condition for a certain or uncertain period. This is accomplished by removing a circular section of the tube; or by keeping the edges apart by blunt hooks secured around the neck; or by the insertion of a tracheotomy tube or canule. In the latter instance an outer tube is fastened round the neck, and an inner tube, the end of which projects beyond the outer one (fig. 129), placed within it, so that it can be removed at will, for the purpose of cleansing it from the congealed mucus, blood, and sputa, which are apt, under certain circumstances, to accumulate within it and clog it, so as to offer a fresh impediment to the free access of air to the trachea.

Fig. 129.



Trousseau's double tracheotomy tube.

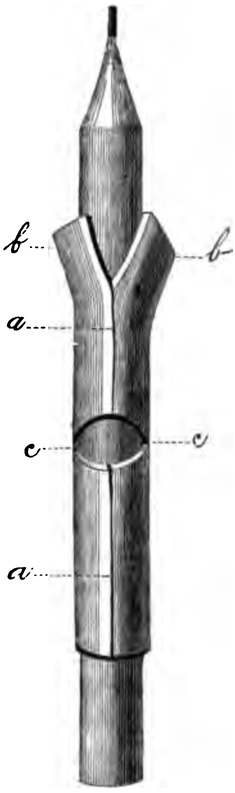
The necessity for performing tracheotomy on the instant sometimes occurs when the surgeon is not provided with proper instruments, or with a tracheotomy tube for insertion after the operation. In these imperative cases delay of any kind would be fatal, and the operation must be performed promptly and at all hazard. Should the case terminate unfavorably, the surgeon must be able and willing to bear the responsibility of his action. This is one of the sacrifices that professional duty sometimes exacts from us. It is part of the cost of practising medicine. Better to make the attempt to save life and fail, than to look supinely upon the final agony with one's hands in his pockets. The occasions for this sudden interference occur sometimes in the course of regular practice, but more often at the dining-table or upon the street, or upon some occasion when the physician is present as a spectator, but not in his professional capacity. If he sees a person suffocating from strangulation and is unable to set the cause aside, it is his imperative duty to open the trachea or larynx by one bold incision; with his pocket-knife, if he have no other instrument by him. The knife may be plunged into the crico-thyroid space, and then turned around in the cut to enlarge the opening for the access of air. There is no time for dissection, and if the patient is not rescued it will not have been from neglect of the surgeon. Suppose an arterial branch be wounded; the operator must incur the risk of wounding it. A quill, a tooth-pick, a tube from the barrel of a pencil-case, answers the purpose of a temporary canule until a suitable one can be procured; and until this substitute is in readiness for insertion, the wound is kept patulous by retaining the knife crosswise in it.

An admirable tracheotomy tube in a case of emergency, one which can be made in a few moments, has been recently introduced to the notice of the profession by Dr. Benjamin Howard, of New York,[1] who extemporized it for the first time during an emergency which happened while on a shooting excursion. It is a regular tracheotomy tube made out of lead, a metal almost always accessible in some form or other; the material having been a Minié bullet on the occasion referred to. The directions of Dr. Howard are as follows:—

---

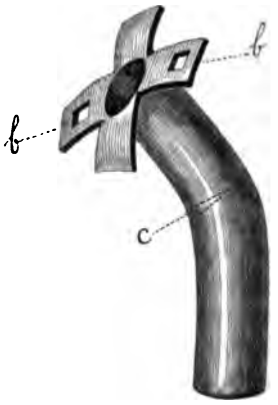
[1] *The Medical Record*, Nov. 1871, p. 391.

Fig. 130.



The sheet of lead rolled around a pencil, *d*.—*aa*, Seam down centre bevelled and dressed smooth. —*bb*, Slips cut at upper end of tube, to be turned down as at *bb*, fig. 131, two of them being there pierced with eyelet-holes. —*cc*, Section cut out transversely from two-thirds the circumference of the tube, which at *c*, fig. 131, is bent upon itself.

Fig. 131.



Leaden Canula.—*bb*, Flange and eyelet-holes.—*c*, Joint where tube is bent on itself.

"Take a piece of lead, whether in the form of sheet, pipe, or bullet, and, if necessary, hammer it out as thin as it can be used without breaking. Of this cut a piece the shape of a parallelogram about two and a half by one and a quarter inches, or enough larger to allow a margin; roll it around a trimmed stick, ramrod, or pencil, thus making a tube as in Fig. 130, and level both edges so that, by trimming and dressing, the seam may be smooth and firm. Cut the upper end so as to form four slips of equal size, *b b*; and at about the middle of the tube cut out a transverse elliptical section from about two-thirds of its circumference (fig. 130 *c c*). Withdraw the pencil and bend the tube upon itself. Turn down the slips, and in two of them cut eyelet-holes through which a string or tape may be passed around the neck, to retain the canula in its position in the wound."

A similar device was resorted to by Prof. Trousseau in 1828, and is mentioned in his lectures.[1]

Laryngotomy.—The position of the crico-thyroid ligament being determined by the touch, an incision, from an inch to an inch and a half in length, is made in the middle line, so that its central third shall expose the ligament, the incision dividing the skin and cervical fascia. The parts may be made tense between the thumb and fingers of the disengaged hand, or they may be pinched up into a transverse fold and be divided after transfixion of the base of the fold. The ligament is then freed of any superimposed tissue not divided by the first incision, great care being taken to avoid wounding the communicating branch of the two thyroid arteries which may be in the way, and which is to be shoved to one side, twisted, or divided between a double ligature cast around it, as the peculiarity of the case may determine. The ligament is then divided by a horizontal or vertical section, according to the nature of the case, and if the opening thus made is insufficient, it is to be split crosswise. When an opening into the ligament is not large enough for the purpose required, the cricoid cartilage is to be divided, and, if need be, even a portion of the thyroid cartilage, care being taken in the latter operation to avoid wounding the vocal cords. Care must be taken not to injure the posterior wall of the larynx with the point of the knife, and also not merely to push before it the anterior laryngeal mucous membrane, which is sometimes detached from the ligament. Entrance into the cavity of the larynx is denoted by a peculiar whizzing sound and the escape of air, mucus, and blood from the opening.

Tracheotomy.—This operation may be performed most expeditiously in the following manner, which, in its essential points, is that recommended by Prof. Langenbeck:—

The operator standing at the right side of the patient, and a skilled assistant at the left, an incision is made into the skin and subjacent fascia, either by rendering the integuments tense, or by pinching up a transverse fold of tissue. This incision extends from the cricoid cartilage to about within a third or fourth of an inch from the top of the sternum, being from an inch and a half to two inches in length. Any arteries wounded in this incision being secured, the operator seizes the subcutaneous connective tissue with a pair of sharp-toothed forceps on one side of the middle line and parallel to it; the assistant seizes it in like manner at a corresponding point on the opposite side, and the two raise the fold of fascia, which is then divided by the operator. In this way they proceed with fold after fold, taking care to press the large veins aside as well as may be, and, when they cannot be avoided, to ligate them in two places and cut between the ligatures. The sterno-hyoid and sterno-thyroid muscles are then separated by the handle of the knife, with as little use of the blade as possible, exposing the upper portion of the trachea, which is usually covered by the isthmus of the thyroid gland. This structure is avoided, when practicable, by pushing it upwards, or by endeavoring to reach the trachea from below it; but if this cannot be done with safety, two ligatures are thrown around it, and it is then divided between them. During all this time, an assistant at the head of the patient keeps the field of operation clear from blood with small pieces of sponge tied to a stick, or held in forceps. As soon as the trachea has been fully exposed, a sharp tenaculum is thrust into it, and it is raised somewhat upwards, and steadied, when it is divided from below upwards in three or four of its upper rings by a sharp-pointed bistoury, inserted into one of the interspaces. Care must be taken to penetrate the mucous membrane of the trachea on the one hand, and to avoid striking the posterior wall on the other. The fact of penetration is confirmed by the peculiar hissing sound with which the air rushes out of the wound, and by the convulsive cough which shoots the blood and mucus out to a great distance. The operator now seizes the edge of the tracheal wound upon the left side with a pair of toothed slide-forceps, closes the slide, and hands the instrument to his assistant, when with a similar pair of forceps he secures the other border. Slight traction being now made, the edges of the wound are separated; and if the canule is to be employed, it is then introduced. If the trachea has not been opened sufficiently, it is again raised up from the bottom of the wound, and the opening is enlarged with a probe-pointed bistoury, care being taken that no vessels are in the path of the knife.

---

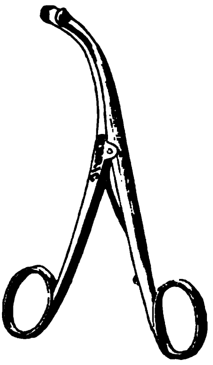
[1] Lectures on Clinical Medicine, Sydenham So. Edition, Vol. II. p. 489.

Hemorrhage is restrained by small pieces of ice enclosed in a fold of towel or napkin, and held in contact with the bleeding surfaces. Should this not suffice, the bleeding vessels should be sought for and secured by ligature. As a rule, the hemorrhage should be controlled before the incision is made into the trachea, and for obvious reasons. If the hemorrhage is merely venous and due to the existing impediment in respiration, the trachea may be divided at once and the tube be introduced, when, with the free access of air, the ordinary course of the circulation will be resumed, and the hemorrhage will usually cease spontaneously; indeed many authors state that it will always be arrested at once. The hemorrhage is sometimes very great, even when there have not been any anomalous vessels in the way to complicate the operation; at other times, the action of the circulatory system has become so much enfeebled by the want of air, that the hemorrhage is insignificant.

A good deal of spasmodic disturbance attends the introduction of the tube, which renders it sometimes difficult to retain it in position while securing it to the neck; but this usually passes off in a few minutes.

Sometimes considerable difficulty is encountered in introducing the tracheotomy tube. Sometimes this occurs from the insufficiency of the artificial opening, and sometimes from the resiliency of the cartilages. I have never had any difficulty of this kind, and have usually placed a tenaculum in the wound upon one side, while an assistant placed another on the other side, and then by gentle traction the edges of the wound were separated, and the tube slid down between the posterior faces of the two instruments which guided the canula safely and speedily into the trachea. Some surgeons secure the trachea on each side by a ligature; divide it between the two ligatures, and separate the lips of the wound by drawing on the ligature. It is possible, by drawing the edges of the wound too far apart, to so flatten the caliber of the trachea as to prevent the insertion of the tube for mere want of room.

Fig. 132.



Trousseau's Dilator for use in Tracheotomy.

Prof. Trousseau long ago devised a special dilator (fig. 132) for the tracheal wound and the guidance of the canula, which is considered by some surgeons as an indispensable requisite in the operation. The instrument is introduced into the wound closed, its branches are then separated, and the tracheotomy tube slid down between them. The ends of the blades are turned in opposite directions, and thus facilitate the movement of the canula.

After the tube has been inserted, and respiration is quiet, the edges of the external wound above and below the tube are brought together by adhesive strips, care being taken to leave the lower end of the wound patulous for drainage. A piece of oiled silk is slit and slipped under the shoulders of the tracheotomy-tube, to prevent it from rubbing the skin; and the wound is dressed with cold water or with a greased rag, at the fancy of the operator.

A piece of gauze or muslin is then straddled upon a piece of adhesive plaster, and secured at the upper portion of the neck. This protects the tube from dust, and modifies the temperature of the inspired air by retaining some of the warmth of the breath of expiration. The dressing may be attached to the neck in the same manner. It saves the discomfort of tying bands around the patient's neck, and admits of ready inspection of the parts. This mode of dressing was brought to my notice by Dr. Packard.

As long as the patient is confined to his room, which ought always to be for four or five days at least, the apartment should be kept warm, at a temperature of not less than 80° F., and even upwards, 85° to 90° at times with advantage, the heat being regulated by a thermometer; and more or less of an atmosphere loaded with steam should be secured by some of the means narrated in connection with the subject of croup. This lessens in great measure any risk of bronchitis or pneumonitis, a risk which is, perhaps, always present in a greater or less degree.

For the first twenty-four hours, the inner canule should be removed every two or three hours and be immersed in warm water, for the solution of the gummy deposits which adhere to it, and it should not be reintroduced until after the outer tube has been cleansed in position, by means of a feather, or a linen or sponge mop, securely fastened to a whalebone or other stem. The removal and insertion of the inner canule very often provoke spasmodic cough at first; this can be lessened, in the latter instance, by warming the tube before introducing it. After the first twenty-four or forty-eight hours, there is rarely occasion to remove the inner tube more than three or four times a day, unless it become occluded, a condition which will become evident by the sensations of the patient, or his movements, if too young to express them. When it is proposed to remove the canula permanently, a finger is placed upon its orifice, to ascertain whether the patient can breathe comfortably through the larynx with the air that passes by the side of it; and if this appear to be the case, the tube is withdrawn, but kept within easy reach for reintroduction if necessary. The external wound usually closes promptly without any interference.

Should fungous granulations present at the wound at any time, they are to be repressed by local applications of tannin, gallic acid, or nitrate of silver; or if extensive, they are to be snipped off and their bases cauterized.

The use of tracheotomes is unsurgical, and sometimes hazardous.

The operations of laryngotomy and tracheotomy may be performed with the patient in the recumbent or semi-recumbent position, as circumstances may dictate.

The head should be thrown somewhat back and the shoulders elevated, so as to render the larynx and trachea prominent; but care must be taken not to throw the head back too far, and thus compress the trachea and impede respiration.

CATHETERIZATION OF THE LARYNX AND TRACHEA.

Catheterism of the upper air-passage is occasionally resorted to in cases of mechanical obstruction to the entrance of air, other than that produced by the presence of a foreign body. This may occur from stenosis within the larynx or trachea; from external pressure upon the trachea; from paralysis of the muscles opening the glottis; or from spasmodic closure of the glottis. It is also resorted to for the purpose of practising injections into the trachea or bronchi. A simple elastic catheter of large size and sufficiently long (about 12 inches), is usually employed for this purpose. This method was much employed for injecting the bronchi or pulmonary cavities by the late Prof. Horace Green, of New York, who recommended bending the catheter to a suitable curve and then dipping it in cold water, to give it sufficient stiffness to do away with the use of the metallic guide. The French surgeons prefer a silver instrument. Care must be taken that the instrument is not passed into the œsophagus. With the aid of the laryngoscopic mirror a mistake of this kind can be avoided.

In cases where the catheter is to be retained for any length of time, its presence in the mouth is often very uncomfortable. On this account it has been recommended to allow the upper end of the catheter to protrude through one of the nostrils, which is accomplished by fastening it to the staff of a Bellocq's canula passed through the nostril. Sometimes the catheter cannot be directed into the trachea through the mouth, and it is then recommended to pass it through the nostril in the first instance, a procedure usually more embarrassing, but sometimes not difficult of accomplishment.

When the catheter has entered the trachea, there is usually pain, cough, spasm, loss of voice, and egress of air through the tube. All these symptoms may be produced with the catheter in the œsophagus.

AFFECTIONS OF THE LARYNGO-PHARYNGEAL SINUS.

Particles of food will sometimes lodge in the pyriform sinuses and give rise to ulcerative inflammation. Fish-bones sometimes tear the mucous membrane in their passage to the œsophagus. The sensations of this lesion are a more or less continuous pricking as by the presence of a sharp or pointed body, more particularly on swallowing, also on coughing, sneezing, or any movement of the parts, such as stretching the tongue. The abraded or divided surfaces are put upon the stretch, giving rise to the pain. There is usually a more or less copious secretion of mucus in the sinus, sometimes filling it, and hiding the affected spot from view. A sponge plunged into the sinus will absorb this fluid, and the parts can then be examined.

The passage over the parts of a sponge dipped into a solution of nitrate of silver will soon eradicate the entire trouble.

The glands at the bottoms of these sinuses are sometimes liable to take on inflammation and ulceration. This condition attends phthisis not infrequently; but may exist independently of this or any other apparent systemic affection.

An ulceration in one or both of these sinuses may be mistaken for laryngitis, as it may give rise to irritation, pain, hoarseness, cough, and purulent expectoration. A case of supposed chronic laryngitis, which had gone the rounds of several large hospitals in Great Britain and the United States during eighteen years, and had been ineffectually treated, though occasionally relieved, by the passage into the larynx of a sponge probang loaded with a solution of nitrate of silver, was found by the author, on laryngoscopic inspection, to be due to ulceration in one of these sinuses, and was effectually cured by a few local applications of the nitrate of silver, made under guidance of the laryngoscope. This case, on account of the view it afforded of the entire trachea, and several rings of the right bronchus, was exhibited some years ago at Wilkesbarre to the members of the Medical Society of the State of Pennsylvania.

CHAPTER XIV.

DISEASES OF THE NECK AFFECTING THE DEEPER TISSUES OF THE THROAT SECONDARILY.

THERE are a number of affections of the external portion of the throat, affecting the internal structures by their presence, and the inflammation and suppuration to which they give rise. Most of these are treated of in surgical treatises under the head of affections of the neck, but some of them are very lightly touched upon.

DIFFUSE INFLAMMATION OF THE TISSUES OF THE NECK.

We sometimes meet with a diffuse inflammation of the tissues of the neck which cannot be referred to any one organ, although the submaxillary and the cervical glands are often implicated. These inflammations appear to originate in the cellular tissue, and become dangerous on account of their rapid extension to the surrounding and deeper structures. The connective tissue between the various muscular tissues of the neck becomes destroyed, irregular abscesses form which point externally or break into the trachea or œsophagus, or even into the mouth, the pus sometimes following a circuitous route for that purpose. In one case lately seen by the author the affection began, after the extraction of a tooth, by an inflammatory swelling of the submaxillary glands, principally upon the opposite side, closing the jaws immovably and deforming the visage to a marked degree. The lower tissues of the neck were not affected at first. In a few days the abscess burst into the mouth, at a point opposite the second molar of the lower jaw on the side of the greatest enlargement, and for several days discharged large quantities of fetid ichorous pus. The abscess then extended beneath the digastric and omo-hyoid muscles and presented externally over the thyroid cartilage, at which point it was opened by incision, giving egress to several ounces of horribly offensive pus, in which were clots of blood and débris of dead cellular tissue. As soon as this counter-opening was made the discharge by the mouth ceased. The parts gradually resumed their natural appearance; but although the submaxillary swellings subsided as soon as the abscess commenced to discharge in the mouth, the rigidity of the jaws did not subside until several days after the incision of the abscess in the neck. During all this time the teeth were slightly separated so that the tip of the tongue could be passed between them, and this enabled sufficient concentrated liquid nourishment to be taken to keep up the patient's strength during the progress of the abscess.

Diffuse abscesses of this kind require to be carefully watched, so that due advantage can be taken of any disposition they make towards coming to the surface. This will be indicated by the erysipelatous blush, and the œdematous condition of the external parts. Before this time it cannot be known at what point the pus may may make its appearance, and it would therefore be injudicious to dissect the tissues of the neck in order to hunt for it. But as soon as the abscess can be detected externally it should be opened by incision, to prevent the burrowing of the pus by the sides of the trachea, or into the chest behind the sternum, a circumstance which would be almost inevitably followed by penetration of the pleura and the discharge into that cavity of a highly offensive and irritative material.

Pirigoff[1] recommends the division of the tissues of the neck where tension is greatest, for antiphlogistic purposes, even when the position of the abscess cannot be ascertained.

Discrimination is necessary in opening abscesses of the neck, especially if they are circumscribed. They are sometimes situated over large arteries, which impart to them their pulsation, so that it is rendered difficult to distinguish an abscess from an aneurism. On the other hand, an aneurism may be mistaken for an abscess, as in the well-known case of Liston, who unintentionally opened an aneurism in the neck of a child. Wardrop's investigations show that aneurisms of the neck are most likely to appear in certain situations. Thus an aneurism at the root of the carotid artery will show itself first in the small triangle between the sternal and clavicular portion of the sterno-cleido-mastoid muscle; an aneurism of the innominate artery on the tracheal side of that muscle; and an aneurism of the subclavian at the outer side. These points may be referred to in a case of doubt.

---

[1] Kriegchirurgie. 1864. p. 113.

Fortunately these cases of abscess are comparatively infrequent. They are often fatal, and usually by pyæmia and not by suffocation. The bones in the neighborhood are sometimes affected. I saw one case after recovery, in which the abscess broke just over the sternum, the adjacent ends of the clavicles having apparently undergone inflammation and slight loss of substance. The lower jaw, the hyoid bone, and the larynx have been found to have undergone disease in consequence of abscesses of the kind under consideration.

TUMORS OF THE NECK.

Atheromatous, fibrous, sarcomatous, enchondromatous, cystic, and other tumors of the neck occur, and by their mechanical position or by their pressure on important vessels and nerves produce serious secondary affections, referred to the larynx, trachea, pharynx, and œsophagus. They are not usually directly dangerous to life unless they acquire a great bulk.

In many of these cases it is impossible to know the nature of the tumor until it has been removed, for which purpose an operation is sometimes necessary on account of immediate danger to life. As a rule, however, they are not operated upon for the mere purpose of getting rid of the deformity they produce; for it is impossible to know beforehand the nature of the attachments which the tumor may have made, and which may implicate the carotid artery, the jugular vein, or the pneumogastric nerve.

We are therefore thrown back upon general treatment, with leeching, blistering, and the rubbing in of absorbent ointments into these tumors. Lymphatic tumors of recent formation sometimes subside under the influence of treatment of this kind; but those of long standing, and tumors of other kinds, are not very amenable to treatment.

Electrolysis has been suggested as affording a means of producing recession or absorption of these tumors; and some cases of success are reported[1] by Mauduyt, Duchenne, Demarquay, and Meyer. In three cases of atheromatous tumor, apparently of the same nature as some of those referred to, the process was faithfully tried by the author for an extended period without success; and one case was placed by him, after failure in his own hands, under the care of a physician specially skilled in the applications of electricity to medicine and surgery, but without a more successful result.

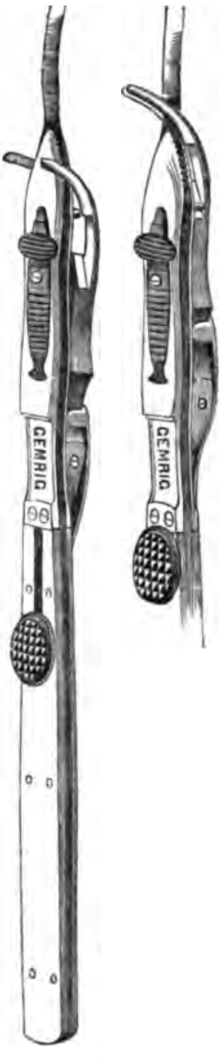
Tumors in the mediastinum produce symptoms affecting the larynx, trachea, etc. Thus they produce hoarseness; aphonia; whistling or stridulous inspiration; expectoration, sometimes sanguinolent; vomiting; and, towards the last, epistaxis.

Operations for the Extirpation of Tumors of the Neck.—If the tumor occupy the anterior portion of the neck, a vertical incision is usually made in the median line; but if it be in the region of the sterno-cleido-mastoid muscle or beneath it, the incision is made in a line with the anterior or posterior border of that muscle, or a double incision is practised including a space equal to the breadth of the muscle, as the case may be. It is only under unavoidable circumstances that this muscle is to be cut, and therefore the external incisions are made so as to admit of working beneath it, to facilitate which the muscle is relaxed by bending the head to that side. If its division cannot be avoided, it should not be cut to any extent greater than is absolutely necessary. As a rule, bleeding vessels are scrupulously ligated, and careful dissection made to the sheath of tissue in which the tumor is embedded, when an attempt is made to detach it by the fingers alone without the aid of any cutting instrument. When closely adherent, its connections are broken down as far as may be deemed safe, and the root of the mass is encircled by a very stout double or triple ligature so as to compress any vessels which it may contain; and the division is made in front of the ligature. If the operation present complications of hemorrhage and the tumor is to be removed at all hazards, it should be removed from its cardiac surface first, in order to avoid the frequent ligation of vessels from the same trunk. Care must be taken to see whether the tumors have formed attachments with the sheath of the great vessels, lest they be incautiously wounded; and in examinations to determine this point the natural relation of parts must not be disturbed too much, else, as I have witnessed in an operation for the removal of a cystic tumor from the neck of an infant, unnecessary dangers may be encountered; in this instance the internal jugular vein was drawn out and lengthened so as to look like the wall of the cyst, and, had it not been for the prompt attention of a skilled assistant, the vein might possibly have been wounded.

---

[1] Moritz Meyer; Electricity in Practical Medicine. Hammond's Translation. N. Y., 1869. p. 480.

Fig. 133.



Dr. Addinell Hewson's Torsion Forceps.

After removal of the tumor the upper portion of the external wound is united by suture, and a pledget of linen inserted in the lower portion to prevent union and permit drainage. A cold-water compress, or an oiled rag, as may be preferred, with lint to absorb the secretions, secured by bandage, completes the dressing.

Severe inflammation is liable to occur after extensive operations in the region of the great vessels of the neck; and this is to be met by the usual antiphlogistic treatment.

Fig. 133 is introduced to illustrate an admirable instrument recently devised by Dr. Addinell Hewson, of the Pennsylvania Hospital, for seizing and twisting bleeding arteries. It can be manipulated with a single hand, and could be very advantageously used in controlling the hemorrhage that sometimes attends operations in the neck.

MUMPS.

Mumps is the name given to a peculiar contagious inflammatory affection of the parotid gland and the surrounding tissues. It occurs chiefly in young male adults, especially when crowded together in colleges, armies, jails, etc.; but it may affect women and children also. It is sometimes epidemic. The disease, whatever its nature may be, is liable to be continued, as it were, in the testicles or the mammæ, its extension to these organs, when occurring, being part of the real progress of the disease rather than a mere metastasis.

The first symptom of the affection is usually pain and stiffness at the angle of the jaws, followed by swelling behind and below the ears, sometimes on one side only, more frequently upon both. Deglutition becomes painful, and there is difficulty or inability to open the mouth. Sore-throat is often complained of, and ear-ache also not infrequently. There is more or less fever, with the attendant symptoms of that condition for two or three days, when it gradually declines. Very often, as the fever declines, the swelling over the parotid region subsides, and is followed by swelling of the testicles in the male or the mammæ of the female, one or both glands being affected. There are sometimes symptoms of a similar transference of the morbific influence to internal organs. Sometimes it takes place to the brain, threatening collapse, meningitis, or even mania; and this cerebral disturbance sometimes terminates fatally. The parotid gland rarely suppurates; but the affection is said to terminate in this manner occasionally.

The treatment of mumps is mildly or actively antiphlogistic, according to the vigor of the patient and the character of the case. I have found good results from the hot-air or sweat bath, conducted in the patient's room by means of burning alcohol beneath a chair upon which the patient sits enveloped in a blanket. Warm applications are kept to the inflamed part; for which purpose a wad of soft cotton, wrung out of boiling water, and then placed in a bag of oiled silk, is one of the nicest applications I know of. Cold applications are to be avoided, lest they repel the disease to the testicle. A slight saline cathartic is sometimes indicated, but active treatment is not often called for. If the testicle becomes involved, warm fomentations are required, with confinement in bed, if the patient has been permitted to sit up.

If the brain becomes involved, stimulants will be called for in a state of collapse; the lancet, cold to the head, purgatives, and counter-irritants at a distance, in mania.

Permanent injury to the gland, or to the constitution, sometimes follows this affection. Blistering, the use of mercurial and iodized ointments, are recommended for the enlarged gland, and tonic and alterant remedies for the constitution.

A swelling of the lymphatic glands in the region of the parotid, sometimes, perhaps, of the parotid itself, occurs not infrequently in connection with abscess of the pharynx, as already mentioned in a former portion of this volume; and a case of pharyngeal abscess may therefore be mistaken for mumps; and a similar condition sometimes occurs in connection with adynamic pneumonitis.

BURSAL TUMORS OF THE THYRO-HYOID REGION.

There are three bursæ in the thyro-hyoid region, which occasionally become the origin of cystic tumors. One of these occurs in front of the thyroid cartilage, and is known as the ante-thyroid bursa; it is subcutaneous. Another occurs below the hyoid bone, and is known as the infra-hyoid bursa. It is occasionally multiple. The third bursa is found in the structure of the root of the tongue, and is known as the supra-hyoid bursa; it is situated on the upper border of the hyoid bone, between the posterior insertions of the genio-hyoid and genio-glossal muscles; it appears to be an abnormal bursa, met with only occasionally. These bursæ are liable to inflammation, serous and viscid accumulations, and the diseases of bursæ in other regions of the body; the infra-hyoid bursa being affected the most frequently, and the supra-hyoid bursa the least frequently.

Cysts of these bursæ, technically known as hygromata, occur not infrequently, and may attain sufficient size to interfere with deglutition, articulation and respiration. They may undergo spontaneous absorption, but this is infrequent; and, when large enough to interfere with function, they require operation. Troublesome fistules are apt to remain after the discharge of one of these cysts. The affection is supposed to originate from mechanical irritation of the bursa; and it is of slow progression. The diagnosis of such cysts rests on their seat, and the result of puncture with the exploring needle. Their contents do not differ from those of other cysts, save that they do not contain any epithelial elements, the presence of which is indicative of glandular origin, and, under these circumstances, referable to the thyroid gland.

Incision, excision, and extirpation of these cysts have been practised; the first two operations are not often successful; and extirpation, complete or partial, seems to be followed almost inevitably by a fistule, which is hard of cure. Puncture and the injection of iodine after discharge of the cyst seems to offer the best chance of success. For further details, and the records of a number of interesting cases, the reader is referred to the classical work of Gürlt.*

AFFECTIONS OF THE THYROID GLAND.

The normal thyroid gland is of comparatively small size, and is seldom the seat of surgical injury. It is subject to disease, however, such as inflammation and the formation of abscess; but the most frequent affection by far is either hypertrophy, or the development of cystic tumors in its interior, or upon its exterior. These affections occur in females much more frequently than in males, possibly on account of some sympathetic relation between the gland and the uterus. The thyroid gland of some individuals often swells during menstruation to a perceptible degree, slight though it may be. A similar effect frequently follows impregnation; and in olden times, the size of the neck was measured as one of the tests of virginity. Certain forms of enlargement of the thyroid gland increase very much in size during each successive pregnancy or lactation, and retain the enlargement acquired at this period.

---

* **Ueber die Cystengeschwülste des Halses. Berlin, 1855.**

This chronic enlargement of the thyroid gland is termed goitre or bronchocele. It frequently exists endemically, in the valleys of mountainous districts especially; being so universal in some localities that immunity from the affection is regarded by the people as a species of deformity, or an arrest of development. Strangers visiting these regions and remaining there for any length of time sometimes acquire goitre, which usually disappears spontaneously on removal from the locality. This has been noticed not infrequently in the troops of Continental armies when sent into regions where goitre prevails; a few weeks' sojourn being sufficient to produce such an enlargement of the gland as to render the collar of the uniform coat too tight to permit the due performance of military duty. The infantry, whose respiratory organs are impeded in action by the weight of the knapsacks they have to carry, suffer more than soldiers in other branches of service, whose respiratory organs are less taxed.

Exertion of various kinds, chilling of the exposed throat, and other causes of similar nature, seem to favor the development of goitre; but the real cause is not well understood, even in those localities where it exists endemically.

In certain of the valleys of the Alps goitre is associated with a condition approaching to idiocy, and which is called cretinism. Some recent observations have detected a great difference in the temperature of the two sides of the valleys where the Cretins reside; this temperature being subject to certain considerable fluctuations; and it is believed that this may have a great deal to do with the development of goitre, in consequence of its influence on the circulatory system.

A peculiar variety of goitre is termed exophthalmic goitre, on account of the abnormal prominence of the eyeballs which accompanies it; a prominence sometimes amounting to protrusion, and due to an accumulation of fatty products behind the eyeball, or to serous infiltration of the connective tissue of the orbit. It is also accompanied with dilatation and palpitation of the heart, the impulses of which are over one hundred in a minute; and sometimes exceed this by twenty beats, and even more, under the influence of emotion and physical exercise.

There is often a systolic murmur from functional valvular derangement of the left side of the heart. It is sometimes an accompaniment of anæmia, but also exists with plethora, and is encountered almost entirely in young adult females. It was first properly described by Prof. Graves, of Dublin, and is known as Graves' disease. It is also known as Basedow's disease, from the attention called to it by a German physician of that name. The thyroid gland swells in its entire extent into an easily compressible tumor of large size, usually, and is accompanied by a systolic thrill of the superior thyroid artery, which is very sensible on delicate manipulation of the tumor. The pulsation is often perceptible to the patient, and is attended with throbbing of the carotids and with a hammering or singing noise in the ears. When the patient maintains a recumbent position, these symptoms are less manifest. The eyes are usually in constant motion; and in marked cases, the protrusion of these organs is so great as to prevent closure of the lids even in sleep. Sometimes there is paresis of the upper lid, and sometimes there is strabismus. The sight suffers. Inflammation of the cornea sometimes supervenes in consequence of its constant exposure. The nutrition of the system is impaired, and the patient sometimes dies, in the course of several years, from marasmus.

Dr. Graves considers the affection a neurosis of the sympathetic nerve. Prof. Stromeyer[1] considers the exophthalmus an additional evidence of the nervous nature of the affection, from the fact that he has observed a similar condition, independent of any affection of the thyroid gland, in the habitual spasm of the sterno-cleido-mastoid muscle; in which, however, the protrusion of the eyeball is confined to the side of the muscle affected, occurring only when its contractions are excited by an erect position of the head, or under the influence of emotion. This habitual spasm of the sterno-cleido-mastoid muscle, Stromeyer says, is considered by every one as a neurosis; and the fleeting exophthalmus which exists in connection with it appears to be dependent upon spasm of the oblique muscle of the eyeball, and of the levator palpebræ.

---

[1] Op. citat., p. 389.

A marked case of exophthalmic goitre, attended with acute mania, was placed under the care of the author a few years ago. The contortions of the patient, when under the influence of the cerebral excitement, were extreme; and implicated the entire body, so that it was difficult to keep the patient covered in a state of decency. Being unable at the time to give the case the attention it demanded, I enlisted the services of Dr. Collins, of Philadelphia, who resided a short distance from the patient, and who paid her frequent visits. His great interest in the case, unremitted during a series of two or three years, led to the confirmation of the theory of neurosis; and under the influence of nervous stimulants, ferruginous tonics, and cold applications externally, he was finally enabled to cure his patient, who was exceedingly grateful for his attention. He often speaks to me of "grateful Maggie."

Goitre, as already mentioned, occurs chiefly in females; but it also occurs in males. It may be present as a congenital affection, but more frequently makes its appearance about the period of puberty or early adolescence. Sometimes it occurs in several members of the same family, and seems, at times, to be acquired in consequence of a hereditary proclivity. The size of the tumor may vary from a mere fulness of the gland to a bulk as large as an adult head. A not infrequent size is that of the head of an infant. When very large it usually drags the skin of the neck down and may project over the chest. I have seen an instance where it projected several inches over the chest, looking, in form, not unlike a large gourd of the squash or pumpkin species. The enlargement may be altogether in front; or it may extend beneath the sterno-cleido-mastoid muscles, or behind the sternum. In the latter cases there is a good deal of pressure exercised upon the trachea, giving rise to symptoms of a very distressing character, resembling those of asthma, and productive, ultimately, of pulmonary emphysema. In the variety known as post-sternal goitre, the trachea is compressed into the form of a prismatic cylinder, or an elongated oval, the larger diameter of which may be in the lateral or in the antero-posterior direction. The enlargement is usually very slow, consuming many months or years in its progress. Sometimes the affection remains at a stand-still for a number of years, and then gradually increases in size. As a rule there is no pain in a tumor of this kind, the suffering being produced by pressure upon the windpipe and the large vessels, finally culminating in attacks of suffocation, spasmodic cough, with inability to maintain the recumbent posture; producing a general drain upon the system, accompanied with œdema of the limbs, trunk, and larynx.

The goitre may affect both lobes of the thyroid gland, or only one of them; or may be confined to the isthmus; or to a third or supplementary lobe which sometimes exists; or may affect one lateral lobe, and either the isthmus or the supplementary lobe.

The contents of the tumor varies at different stages. At first it is soft and elastic to the touch, and without any extensive attachments to the surrounding tissues. It is then, in all probability, a mere hypertrophy or hyperplasia of the original structure; and when in this condition is often amenable to the influence of remedial agents. After a while irregularities or nodosities are produced upon its surface, usually indicative of some metamorphosis of tissue, rendering the prognosis of cure much more doubtful. The changes which have been noticed in enlargements of the thyroid gland are inflammation, the formation of cysts, and the fibro-sarcomatous and cancerous degeneration, principally of the encephaloid variety. When inflammation is going on, the parts become hot, and firmer to the touch. This inflammation is sometimes salutary and leads to a spontaneous dissolution of the tumor, a knowledge of which fact has suggested a method of treatment by the artificial induction of inflammation. When this does not occur, the inflammation may result in abscess, or in the formation of permanent fibrinous deposits; or it may extend to the larynx and trachea, endangering a fatal result, either by its action upon these structures, or by pyæmia. The fibrinous deposits of the inflammatory process may subsequently undergo the fatty, or the calcareous degeneration.

The formation of cysts in the tissue of a goitre is favored by the anatomical structure of the gland itself, the cells of which become distended by an accumulation of their natural contents, the cell originally affected enlarging at the expense of its neighbors, the remaining glandular structure undergoing atrophy from pressure. Usually one or a few cysts enlarge in this way to a great size, but sometimes numerous cysts enlarge to sizes varying from that of a pea to that of a plum. In this way the encysted form of goitre is produced, a form recognized usually by the sense of fluctuation, or by the withdrawal of a portion of its contents upon the groove of the exploring needle.

When the cysts are small their contents are viscid, but when large they contain serum, or serum and blood, or coagulated blood, or the débris of fibrous tissue. The cysts are usually complete, but sometimes a portion of their wall is composed of the gland tissue itself. Cystic goitres may attain a very great size, and have been known to contain more than a pint of fluid. Large cysts are not apt to undergo degeneration, but the walls of the smaller ones sometimes become calcified.

A peculiar form of cystic goitre in which new glandular tissue, exactly analogous to the embryonic tissue of the thyroid gland, becomes developed in the cavity of the cyst, has been described by Prof. Stromeyer, and by him designated as parenchymatous cystic goitre. This tissue is very vascular and very gelatinous, so that it can be scooped out with the finger. It presents a deceptive sense of fluctuation when examined externally, and in this way may be readily mistaken for the ordinary cystic goitre with fluid contents. Its diagnosis, however, cannot be always ascertained with certainty, except during the course of an operation.

Goitre of Pregnancy.—It has already been remarked that in certain females an hypertrophy of the thyroid gland occurs during the progress of pregnancy. The enlargement occasionally becomes immense and proves eventually fatal. Two cases of this kind reported by Prof. Guillot[1] will illustrate the subject, and also illustrate some of the most serious symptoms produced by goitre, as well as some important points in its pathology.

"1. A lady, æt. 30, under the care of M. Agouard, Jr., in easy circumstances, of good constitution, never having been sick, born and residing distant from localities favorable to the development of goitre, was surprised to see during her first pregnancy that the anterior region of her neck began to swell gradually; but as she did not suffer at all, and as the progress of the tumefaction was slow, she paid hardly any attention to it. The menses returned after this pregnancy.

---

[1] De l'hypertrophie de la glande thyroïde des femmes enceintes. *Archives Générales de Médecine.* Novembre, 1860.

"Eighteen months afterwards, in 1855, she gave birth to another infant; the accouchement was favorable; she nourished her infant. During this pregnancy the tumor of the neck had augmented anew and became troublesome; at fourteen months she ceased to nurse her infant. The menses, which had reappeared for several months, continued to be regular. The tumor, which increased in size slowly, interfered with the movements of the neck, and respiration often became laborious. Pains radiating from the neck as far as to the precordial region, accompanied by facial neuralgia, palpitations and vomitings, tormented the patient suddenly. Syncopes preceded by vertigo, followed by intermittent asthma and suffocative paroxysms, gave great anxiety to the physician and terrified the patient. The timbre of the voice became enfeebled despite the excellent condition of the constitution.

"I saw the patient in 1858 with M. Trousseau; I found her up and about, without presenting, at the first aspect, any appearance of suffering. The intelligence was clear. The fatigue caused by conversation, and the enfeeblement of the timbre of the voice, were evident; nevertheless the lady made me perfectly familiar with the nature of the phenomena she experienced.

"The tumor, whose diameter might have been two décimètres on both sides, was smooth and covered by perfectly healthy integument, except a few rare vesicles appearing upon the skin. It was divided into two lobes, whose separation was but little distinct; its consistence was that of a rounded lipoma without nodulation. On compressing it there was produced a great difficulty of respiration, as well as dizziness. The only lesion I could discover was the hypertrophy of the thyroid body, and the only accidents which I could detect as liable to occur, not doubtful. It was agreed with M. Augouard and M. Trousseau, that in case of absolute necessity and of imminent suffocation, the operation of laryngotomy might be practised despite the uncertainty of the result which might follow.

"This operation was performed December 19, 1858, some days after the consultation with Messrs. Augouard and Trousseau. During the night M. Richet was called in great haste by the attending physician and by the family, and he found the patient almost asphyxiated. Despite great difficulties, the operation was made rapidly, and was followed by a result at first favorable; the asphyxia disappeared and the patient was relieved; but on the 21st of December she died. An autopsy was not permitted.

"II. A young woman about 29 years of age, born at Paris, of good appearance, not scrofulous, menstruated regularly up to her last pregnancy, following which, the menses again appeared regularly. She perceived that after her first pregnancy, dating four years back, her neck had become larger than usual. She paid little attention to this phenomenon, which did not change until her second pregnancy, that is to say, for about a year and a half. She was confined 19 months ago.

"This young woman entered the Necker Hospital, and no other lesion could be detected in her except the one mentioned. She presented, at the anterior part of the neck, a voluminous tumor, of a circumference of about 30 centimetres, covered by healthy skin, movable, and extending from the thyroid cartilage as far as the sternum; it interfered with the movements of the neck, and prevented the dorsal decubitus. She was subject to frontal neuralgia, and had attacks of asthma. Respiration was difficult, slow, and whistling during inspiration and expiration. The voice was not altered in timbre, but it was tremulous and painful. This woman said that all these phenomena had been produced slowly, but had increased constantly in intensity. She referred their origin distinctly to her first pregnancy, and their new progress to her second gestation. She was annoyed by her clothing, and had an increasing difficulty in walking, in muscular effort, and even in resting in the recumbent position. Her sufferings were becoming exasperated; from time to time, she felt a disposition to sleep; deep-seated pains existed in the chest, and palpitations; suffocation became then imminent. These sorts of attacks, at first slight and far apart, became more frequent and severe, and caused the patient a great deal of trouble.

"All these occurrences were reproduced at the hospital, although the patient could rise and walk during each moment of feeling well. They became more grave, and about eight days after seeing her for the first time, Prof. Guillot thought that she would expire. During each access of suffocation the patient complained of great pain from the middle region of the sides of the neck down to the deepest parts of the chest; and complained more of this pain than of the difficulty of respiration. A continued drowsiness accompanied the asphyxia which succeeded one of these attacks, and which killed the patient.

"Prof. G. was ignorant of the treatment to which this patient was subjected before her admission into the hospital. He performed a venesection. She took pediluvia and received some purgative lavements, and towards the end of her life all her limbs were covered with sinapisms.

"Mr. Lenoir, who saw the patient, did not deem it operable.

"The examination of the cadaver did not reveal any other lesion than the one spoken of. The thyroid body had acquired very nearly the volume of a human brain, including the two pneumogastric nerves, the two carotid arteries and the trachea. This mass was divided in three lobes, of which two only had appeared at the exterior, although the middle lobe was situated beween them; but it was smaller than the others. Behind the tumor, the trachea was found flattened, its anterior posterior diameter not exceeding 3 millimètres, its bilateral diameter being 2 centimètres. This flattening commenced below the larynx, and was prolonged in nearly the entire length of the canal, without there being the slightest trace of any other lesion upon the mucous membrane. Upon the sides of the neck, the two carotids and the pneumogastric nerves had evidently been compressed upon the apophyses of the vertebræ by the weight of the lobes of the tumor. The lungs were congested, and the bronchi filled with frothy material. The tissue of the thyroid body, similar in appearance to the tissue of a healthy organ, did not differ from it in color, in density, nor in volume, but in a series of details which were made apparent by an attentive analysis.

"In the normal state the thyroid gland is formed by a skeleton of slightly dense fibrous tissue, by which are formed a multiplied series of little spaces of a diameter equivalent to one or two millimètres. The interior surface of these little spaces or cells is covered by a very fine epithelium. The interior of each one of these contains an alkaline albuminous liquid, in which swim vesicules, globules, cellules or molecules, perfectly rounded, nucleated, or non-nucleated. The consistence of the tumor under consideration was more firm than in the ordinary condition, being due to an abundance of fibrous tissue, forming throughout the tumor large, thick, and multiple partitions, although their density was not as great as that of ordinary fibrous tissue. The character of the tissue of these partitions was much that which is attributed to fibrous tissue; it was represented by a series of rectilinear elements, some of which still retained the relief of a nucleolus. These elements, felted together by an intimate commingling, formed the partitions and the contours of the spaces, whose diameters were otherwise more considerable than ordinary. There were spaces, in fact, whose breadth was in several points more than three centimètres, and in other points equal to three or two millimètres, representing a series of intermediates, varying from the normal diameter to that just indicated. The walls of these spaces were whitish and pearlish; and although they were not very dense, they were in reality composed of fibrous tissue whose characters the microscope revealed very clearly. The surface of the little spaces formed by these envelopes of fibrous tissue appeared to be covered with epithelium, evidences of which were discovered mixed with the globules contained in each space. But the large cavities which discriminated it from the normal state, did not contain any appearance of epithelial cellules; nothing else was encountered but a series of transparent granulations, spheroidal, nucleated or non-nucleated, such as are ordinarily contained in the normal cellules of the thyroid body. Except the volume produced by the excessive accumulation of the anatomic elements of this thyroid body, everything about it then was similar to that which is observed in an ordinary thyroid body. The only difference was characterized by the absence of epithelium in the cavities most modified in appearance.

"We might then be authorized to consider this lesion of the thyroid body as an hypertrophy of the fibrous and granulous elements which constitute this organ."

The treatment of goitre resolves itself into constitutional and local. It is only in recent cases, and in those of comparatively small size, that treatment can be employed with a fair prospect of success.

Operations of various kinds have been performed for the destruction or removal of a goitrous tumor; but although they have often proved successful, they are not to be resorted to without careful consideration, in view of the dangers attending the operation. The danger arises from the vascular condition of the gland itself; the nature and importance of its attachments, which may involve the large vessels and nerves of the neck; and the complications which may arise during the course of the after-treatment. Many cases of death have been produced by operations upon the thyroid gland; some of them occurring on the operating-table. For this reason, all surgeons approach these operations hesitatingly; while some surgeons, whose authority is the highest in the estimation of their professional brethren, condemn them unhesitatingly.

When goitre is due to residence in a certain locality, removal from that locality would be indicated as the first step towards relief.

The liberal use of iodide of potassium, internally and externally, has been often effective in cases of soft consistence and uncomplicated, even when of considerable size. Should, however, the internal administration of this remedy interfere with the general health, it must be suspended for a time. It has been intimated, on high authority, that this disturbance of the general health is not alone due to the remedy itself, but in great part to the rapid absorption of the constituents of the diminishing tumor. If catarrhal inflammation of the larynx and trachea exist, this must be combated in great measure before resorting to specific treatment for the goitre itself, inasmuch as the constant movement of the gland in the acts of coughing is unfavorable to the retrogression of the tumor. In these cases the muriate of ammonia is indicated, on account of its favorable effect upon inflammatory conditions of the air-passages, as well as for its value in the absorption of hypertrophied tissue. Various other remedies than those mentioned have been recommended in the treatment of goitre; but most of them have been selected empirically, and do not appear to have given as much satisfaction in general as the employment of the iodide of potassium, or the muriate of ammonia.

When medicinal treatment fails in the diminution of the tumor, electricity often offers a fair prospect of success. Cases are on record of successful electric and electrolytic treatment by various authorities, abroad and in this country. Two successful cases of this kind occurred in the author's practice; one of several years' standing, and of large size, in a young man who had undergone the iodic and other medicinal treatment, under the care of competent and eminent physicians, for three or four years. Both lobes of the thyroid were enlarged, one more than the other. Electrolytic treatment with the negative pole inserted by a needle electrode into the substance of the tumor, with the positive pole applied outside by means of a large sponge, caused the absorption of this tumor in a few weeks; but five applications being necessary for the purpose. Four Bunsen cells, of very large size, containing a gallon of very weak solution each, were used in this case, and the current was passed from five to ten minutes at a time.

The other case was that of a young lady some seventeen years of age, with a goitre of very moderate size and of soft consistence, which began to appear some two or three years before, while the individual was in Switzerland on a visit. In this instance, fifteen small Smee cells were used; ten applications being required for the complete disappearance of the tumor, the applications being made twice a week and for about ten minutes at a time. In neither instance was the pain great; so that anæsthesia was not requisite.

In one other case of immense cystic goitre, some little favorable result followed a protracted treatment of some twenty applications, from a Smee's battery of from ten to twenty, and, on one or two occasions, thirty small cells; the number being increased during the application according to the effects upon the patient. Circumstances over which the author had no control, prevented the continuance of the treatment.

In still another instance, a patient with a goitre the size of a large orange was being treated with the induced current for paralysis of one vocal cord. During this treatment the goitre diminished considerably in size, and finally disappeared, though the lady had been encumbered with it for ten or twelve years.

In the treatment by electrolysis, there was always a gaseous swelling produced at the seat of puncture, from the development of hydrogen gas; the tissues around for a considerable distance became very red, and presented a bruised or black and blue appearance, as from a blow of the fist, for a day or two after; and a little eschar was formed at the point of puncture. Occasionally a drop or two of blood followed the withdrawal of the needle, but this was exceptional. On several occasions vertigo, and on one occasion syncope, was produced during the application. No internal treatment whatever was employed during the treatment of any of these cases. In the case of the young girl alluded to, a bag of small shot was worn upon the tumor for several hours every day, in order to favor absorption by equable compression.

In the recent works on electricity, many cases are given of the cure of goitre by electricity; and Dr. Althaus[1] expresses the belief that all cases of bronchocele, however large, may be cured by electrolysis, if the treatment be persevered in for a sufficient time; the cystic variety being much more rapidly curable with it than the solid.

When a goitrous tumor is not amenable to remedial treatment, all that can be done is to keep the health of the patient as good as possible, avoiding all exertion which, by inviting blood to the part, would facilitate its further enlargement or bring on symptoms of compression of the vessels of the neck. If the tumor enlarges beneath the sterno-cleido-mastoid or other muscles, and is thereby pressed injuriously upon the trachea and œsophagus, the tension may sometimes be relieved by subcutaneous division of these muscles.

---

[1] **Medical Electricity. London and Philadelphia, 1870, p. 643.**

In post-sternal goitre, pressing upon the windpipe, it has been recommended that efforts be made to raise the tumor from its bed and attach it to the integuments above, so as to relieve the pressure upon the parts. This has been done by means of a ligature passed through the tumor, by which it is kept directly under the skin at the upper portion of the neck, and then adhesive inflammation is induced, by the formation of an eschar in the integument by means of the Vienna paste or some other caustic.

When the dyspnœa is very great, relief can sometimes be afforded by tracheotomy, provided the compression exist at the upper portion of the trachea, a point which can be determined in some cases by laryngoscopic inspection, as well as by external manipulation of the growth. Pressure upon the nervous trunks will give rise to dyspnœa, giddiness, and other symptoms produced by direct pressure upon the windpipe and blood-vessels; and under such circumstances tracheotomy would be useless.

Various operations have been resorted to for the cure or removal of a goitrous tumor, but usually they have been performed more for relief of the annoying and dangerous symptoms than on account of the deformity. Those cases in which there is no immediate danger threatening life, are usually those which offer the best prospect of success in operating. It is doubtful whether a severe operation be justifiable for the mere relief of a deformity. Halting between these two opinions, surgeons are apt to let the goitre alone.

Whatever operation be performed, there is great danger to life, not during the operation itself, though death has occurred during the extirpation of these tumors, which are sometimes inseparably attached to artery, vein, and nerve; but from the excessive reaction that follows, reaction which sometimes escapes control, and terminates fatally a few days or a few weeks afterwards. Most of the operations are adapted to the cystic form of the disease especially.

Ligation of the base of the gland is sometimes practised, usually after due exposure of the tumor by incision through the integument and careful dissection; but occasionally the subcutaneous ligature has been employed. The ligature is tightened from day to day until there is evidence of the death of the tumor, when it is removed in front of the ligature, or cut off by tightening the ligature still further.

Puncture of the tumor followed by the injection of iodine, after withdrawal of the contents of a cyst, has been practised, the trochar or the knife being employed according to the fancy of the surgeon, or the peculiarities of the case.

Incision is practised by dividing the integument for the length of two inches or more, in the middle line, if the tumor is in front; or in front of or behind the sterno-cleido-mastoid, if the tumor is lateral. The parts being freely exposed by careful dissection, every vessel being tied as soon as wounded, before the cyst is opened, a puncture is made into the cyst, and the contents allowed to drain off slowly. When this has been accomplished, the opening in the cyst is enlarged to the extent of an inch or more, or to that of the external wound, and the edges are kept separated by a strip of oiled lint. Suppuration occurs as a result of the inflammation induced, and its products escape readily by the external opening.

Excision consists in making the incision through the integuments as in the operation last described, and then incising the cyst so as to get rid of its contents; after which the edges of the cyst are excised to a greater or less extent, as the case may be. This is a more serious operation than incision, and much more apt to be attended with hemorrhage, and followed by serious results.

The introduction of a seton, either through skin and tumor, or through the tumor only, after division of the skin, has been practised with success; but the treatment is very protracted, and not devoid of the unpleasant results that follow the other operations. Where the seton is thrust through the skin, it is recommended that it be a silken thread passed by means of a large needle instead of a regular seton lancet, as presenting less danger of hemorrhage. Additional threads may be introduced as the case progresses.

Ligation of the thyroid arteries has been employed. These arteries sometimes acquire the bulk of the carotids, and it has been thought that starvation of the tumor, by their ligation, would deprive it of nutriment and thus induce absorption. This method has no doubt been successful in some instances, but in others it has not proved of any benefit, in consequence of the prompt establishment of the collateral circulation.

Extirpation of the tumor by the knife is sometimes employed, and has often been practised with success; though the operation is, as a rule, condemned. Small tumors with but few attachments are removed readily enough, but large ones with extensive attachments present many difficulties. Operations of this kind should be performed slowly and cautiously, the fingers and knife-handle being used in the dissection; and nothing important should be cut without being first secured by ligature. In this way large tumors have been successfully removed with comparatively little hemorrhage. The names of several American surgeons, especially those of the two Warrens of Boston, are favorably known in connection with this operation. I have witnessed one or two successes under the hands of Prof. Pancoast, and one, very remarkable, under the hands of Dr. Maury of Philadelphia.[1]

AFFECTIONS OF THE THYMUS GLAND.

Affections of the thymus gland are not of frequent occurrence. The number of lobes of the gland is sometimes found increased; and there has occasionally been noticed a marked diminution of the size of the gland, or even its entire absence.

Thymitis.—Inflammation of the thymus gland has been occasionally met with and recognized. There is reason to believe that it sometimes occurs unrecognized. Cases of unaccounted-for death have been found, on dissection, to have been due to purulent inflammation of this gland. Some observers believe that the so-called examples of acute purulent inflammation have been due to the suppuration of masses of tubercles which have had this seat of deposit. That acute thymitis does occur, however, there is sufficient evidence, though the recorded cases are few in number.

---

[1] Photographical Review of Medicine and Surgery. Phila. : Dec. 1871.

Dr. Allan Burns[1] mentions a case of abscess of the thymus gland, with discharge of its contents externally. An ulcer formed externally, from which the patient drew out from between the laminæ of the mediastinum a portion of lymphatic substance about three inches in length. A very curious physico-physiological fact is mentioned in connection with this case, and which has some bearing upon the mechanism of the respiration. When cicatrization of the wound was completed, it was found that the trachea, the innominate artery, and the thyroid branch of the lower thyroid artery were covered merely by a thin pellicle of skin, a covering insufficient to prevent the external pressure of the air upon the trachea, and producing a permanent difficulty in breathing, from sinking in of the trachea above the sternum at each deep inspiration.

A case of distinct thymitis is mentioned by Dr. Chas. A. Lee[2] as having occurred in his own practice, and in which the gland suppurated and discharged externally; and a case of acute inflammation is reported by von Wittich.[3]

Hypertrophy of the Thymus Gland.—The thymus gland occasionally undergoes hypertrophy; but its normal size varies between such limits that enlargement is often erroneously supposed to exist. In the earlier part of the present century, the subject of hypertrophy of the thymus gland strongly attracted the attention of the profession. It was believed by many to be the chief cause of the laryngismus stridulus of infants, from pressure of the enlarged gland upon the pneumogastric nerve, or on the recurrent laryngeal, or from pressure upon the trachea, or on the great vessels. The affection acquired the cognomen of thymic asthma, and was also known as Kopp's asthma, in compliment to the man who most enthusiastically developed the idea then prevalent of the pathology of the affection. Subsequent experience proved that the premises were false on which these conclusions were based. It was found that many children perished of thymic asthma, without any post-mortem evidence of enlargement of the gland; that in some of the fatal cases the gland was actually atrophied, or at least smaller than is usual; and that a few rare but undoubted cases of enlargement were not productive of the asthmatic phenomena. These demonstrations, and the fact that the pressure from a tumor ought to induce constant disturbances of respiration rather than intermittent and spasmodic manifestations, gradually led to the rejection of the theory of Kopp and his supporters.

---

[1] On the Surgical Anatomy of the Head and Neck. Second Edit. Glasgow, 1824, p. 26.

[2] On the Thymus Gland; its morbid Affections, and the Diseases which arise from its abnormal Enlargement. *Amer. Jour. Med. Sci.*, Jan. 1842, p. 140.

[3] Hypertrophie und theilweise Vereiterung der Thymusdrüse. *Virchow. Arch.* 1855, viii. 4.

On one occasion, while operating on a child some six or seven years of age, for removal of foreign body from the windpipe, I was somewhat embarrassed by this gland, which projected upwards into the wound.

Degenerations of the Thymus Gland are also occasionally met with. Cases have been reported of calcareous, tuberculous, and cancerous degeneration.

Sir Astley Cooper[1] relates the case of a young woman, nineteen years of age, who suffered from severe dyspnœa consequent upon the sudden increase of a swelling of several years' duration at the inferior portion of the neck, and supposed to be composed of enlarged lymphatic glands. The patient died at the end of a fortnight, worn out by the irritation excited by the difficulty in respiration. On examination of the body it was found that the disease was situated in the thymus gland; the swelling extending from the arch of the aorta to the lower part of the thyroid gland, which was also considerably enlarged. The thymus appeared of a yellowish-white color, and was divided into several large lobes. It projected into the innominate vein, and its reticular structure, on incision, was found to be filled with a white pulpy material. The trachea was involved in the tumor and its sides were compressed by it, so that its transverse diameter was somewhat diminished.

But little is known concerning diseases of the thymus gland, and their pathology is obscure, except perhaps in those instances where turberculous degeneration occurs as an expression of the general state of system in certain subjects of phthisis.

---

[1] The Anatomy of the Thymus Gland. Phila. edit., 1845, p. 35.

No special treatment can be laid down for these affections. They must be managed upon general principles, and the employment of such measures as tend to improve and maintain the general well-being of the entire system. As most of these affections necessarily occur at an early age, the resort to remedies usually employed for the reduction of enlarged glands can rarely be advisable.

The question of an operation for removal of the gland may sometimes come up, but the judiciousness of the course must rest on the general principles of legitimate surgery. The extirpation of the gland, under certain circumstances, was suggested by Dr. Allan Burns, but there are obvious reasons why such a procedure should not be determined on hastily, or undertaken except as an extreme measure.

"The state of the thymus attracted the attention of Dubois in 1851. He observed in syphilitic children a condition of the thymus that has since been described by Depaul[1] and Wedl,[2] though it is not yet clear how far syphilis is concerned in its production. Collections of diffluent matter, which may be as fluid as pus, or semi-solid, are scattered through the interior of the organ. Hence, probably, a process of a gummy kind produces these dense, opaque, yellow collections. The true nature of the affection is still uncertain. Commonly, no alteration of any kind is found in the thymus." [3]

---

[1] *Mémoires de l'Académie de Médecine*, t. xvii. 1853, p. 563.

[2] Pathological Histology.

[3] Syphilis and local contagious Disorders. London, 1868, p. 226.

REFERENCES

UPON SUBJECTS TREATED OF IN THE TEXT.

The subjoined references, culled from the author's index-rerum, are arranged under "catch-heads" as being more convenient for consultation than an alphabetic list of authors, or a chronologic succession of articles. The list is not presented as a complete bibliography, for a compilation of that kind would consume a greater number of pages than could be devoted to the purpose.

ABSCESS.—Abscess, in a case of cynanche tonsillaris; extended alongside of larynx, denuding hyoid bone, etc. Death from hemorrhage. WATSON (*Med. Gaz.*, Jan., 1829). *Am. Jour. Med. Sci.*, iv. p. 492.

—— Another case. WEBBER, *Am. Jour. Med. Sci.*, vii. p. 415.

—— of pharynx. PRIOU (*Rev. Méd.*, April, 1830), *Am. Jour. Med. Sci.*, vii, p. 250.

—— LOCKHEAD, *Am. Jour. Med. Sci.*, January, 1856, p. 212.

—— of nasal septum in children. GUERSANT, *La Chirurgie des Enfants*, Paris, 1864, 47.

—— Retro-pharyngeal abscess. CHAS. M. ALLIN, *N. Y. Jour. Med.*, Nov. 1851, p. 307 *et seq.* (58 Cases.)

—— of pharynx. BOURNEVILLE, *Mouvement. Méd.*, 1868, No. 9.

—— Retro-pharyngeal abscess. Des abcès retro-pharyngiens idiopathiques, ou de l'angine phlegmoneuse. V. GAUTIER, Genève et Bâle. 1869.

—— with rupture of internal carotid artery. LEISHMANN, *Glasgow Med. Jour.*, Nos. 1, 3, p. 405, May.

—— Post-œsophageal abscess with secondary disease of cricoid cartilage. MACKENZIE. *Trans. Path. Soc. London*, xxi., 1870, p. 56.

—— of thyroid body, bursting into trachea. JONES, *Liverpool Med. & Surg. Rep.*, 1869, p. 133.

—— Laryngeal abscess. TOBOLD, *Berl. Klin. Woch.*, 1864, 1, 4.

—— Abscesses of the larynx. GOTTSTEIN, *Berl. Klin. Woch.*, 1866, iii., 4, 4.

—— Laryngeal abscess with consecutive œdema of the glottis, during convalescence from typhoid fever. DE LACAUSSADE, *Gaz. des hôp.*, 1866, 116.

—— Inflammation of larynx with abscesses. Paralysis of vocal cords. Recovery. MARCET and HILLMAN, *Lancet*, 11, 24 December, 1868.

ANATOMY.—Hyo-epiglottideus muscle. *Am. Jour. Med. Sci.*, vol. v., p. 475.

ANATOMY.—Nasal mucous membrane. Das Epithelium der Riechschleimhaut des Menschen. VON LUSCHKA, *Med. Centralblatt*, 1864, No. 22.

—— Eine quere Schleimhautfalte in der Kehlkopfhöhle. *Sitz-Bericht der k. k. Akad. d. Wiss.* October, 1865, p. 279.

—— Superior constrictor muscle of the pharynx. VON LUSCHKA, *Henlen-Pfeufen Zeitsch.*, xxxi., p. 364, 1867. See also *Schmidt's Jahrb.*, 1867, 142, 1, p. 6. Der obere Schnürer des menschlichen Schlundkopfes.

—— Die Anatomie des menschlichen Kopfes. VON LUSCHKA, Tübingen, 1867.

—— Die Anatomie des menschlichen Halses. VON LUSCHKA, Tübingen, 1862.

—— Der Schlundkopf des Menschen. VON LUSCHKA, Tübingen, 1868.

—— Beiträge zur Kenntniss des Kehlkopfes und der Trachea. VERSON, Wien, 1868.

—— Zur Anatomie des Kehlkopfes und dessen Nachbarschaft. GRUBER, *Arch. f. Anat. Phys. u. Wiss. Med.*, 1868, p. 640. Special points. 1. Lig. hyo-thyroideum accessorium; 2, m. m. thyroidei marginales inferiores, *a*, incisuræ mediæ transversus, *b*, incisuræ mediæ obliquus; 3, m. kerato-arytenoideus; 4, varieties of m. thyreo-trachealis, and of m. hyo-trachealis.

—— Ueber die Vertheilung des Muskeln des Œsophagus beim Menschen und Hunde. KLEIN, *Allg. Med. C. Ztg.*, December 2, 1868.

—— Thyro-hyoid muscle. GEO. BUCHANAN, *Journ. Anat. & Physiol.*, Nov. 1868, p. 255.

—— Hyo- and genio-epiglottic muscle. VON LUSCHKA, *Archiv für Anat. Physiol.*, etc., 1868, p. 224. Also a résumé in *Schmidt's Jahrb.*, 1869, 141, 2, p. 253.

—— Ueber den Canalis cranio-pharyngeus am Schädel des Neugebornen. LANDZERT (*Petersburg. Med. Zeitschr.*, xiv., 3 and 4, 1868, p. 133), *Schmidt's Jahrb.*, 1869. Bd. 152, No. 1, p. 11. Read in connection with Luschka on adenoid tissue of pharynx, about the bursa pharyngea.

—— On the structure of the pituitary gland. PEREMESCHKA (*Virchow Arch.*), *Gaz. Méd. Paris*, 1869, No. 13, p. 171.

—— Adenoid tissue at vault of pharynx. Sur le tissue adénoide de la partie nasale du pharynx de l'homme. VON LUSCHKA, *Journal de l'Anatomie*, etc., May and June, 1869, p. 225, with 3 illustrations. Author refers to his work, "Der Schlundkopf der Menschen," Tübingen, 1868. Also to an article from his pen, "Das Adenoïde Gewebe der Pars nasalis des menschlichen Schlundkopfes," in *Arch. für Mikroskopische Anatomie*, 1868, vol. iv., pl. 1. This article is followed by a note from ROBIN referring to his own account of the same tissue in the Dictionnaire de Médecine of Nysten, article pharynx, second edit., 1855, and subsequent editions.

—— On the mucous membrane of the cavity of the larynx. VON LUSCHKA, *Arch. für mikroskop. Anat.*, t. v., 1, 1869, p. 126. *Schmidt's Jahrb.*, t. v. 4, 1869, p. 142. *Gaz. Hebd.*, 1869, 24, p. 382.

—— Beiträge zur Kenntniss der Nerven-, Blut- und Lymphgefässe der Kehlkopfschleimhaut. *Arch. für mikroskop. Anat.*, 1871, vii., 2, p. 166.

—— Der Kehlkopf des Menschen. H. VON LUSCHKA, Tübingen, 1871.

ANATOMY.—Ueber die acinösen Drüsen der Schleimhäute, insbesondere der Nasenschleimhaut, ANT. HEIDENHEIM. Breslau, 1871.

ANEURISM.—Of transverse part of arch of the aorta, size of an orange; left pneumogastric in front somewhat flattened by the pressure, the recurrent passed behind. Aneurism had opened into œsophagus, and the stomach was filled with blood. J. H., æt. 31, a hawker, intemperate, had experienced stoppage in throat and loss of voice for seven weeks before admission, June 16th, 1863; and for eight days had had difficulty in swallowing solids. Died June 20th, 1863.

—— Of aorta; producing aphonia. FLINT, *Medical Record*, vol. 3, p. 355.

—— Opening into left bronchus, avoiding the left recurrent nerve, wholly without spasmodic symptoms.

—— Of aorta; tracheotomy; terminated three days after by rupture into trachea. CUMMING, *Dub. Quart. Jour.*, May, 1868. Suffocation was imminent, from compression of trachea and tension of recurrent laryngeal nerves.

—— Abdominal; inducing aphonia, cough, dyspnœa, etc. Aphonia due to œdematous condition of vocal cords. Aphonia was temporary and recurrent. Cough dry, barking and spasmodic. W. MOORE. *Dublin Quart. Jour.*, August, 1869, p. 13.

—— Of aorta. Two cases causing pressure on left recurrent nerve and paralysis of muscles of larynx. MORELL-MACKENZIE. Remarks of Dr. C. J. B. Williams, Sibson (case reported in Path. So. Trans.) Path. So., April 19, 1870. *Med. Times & Gaz.*, June 4, 1870, p. 620.

—— Case opening into trachea. Tracheotomy. Autopsy. T. A. BARKER, *St. Thomas Hospital Reports*, 1870, p. 331. Some account of three other cases producing constriction of glottis, where tracheotomy prolonged life, but only for a few hours.

—— Of aorta; implicating, in its pressure, the recurrent laryngeal nerve, the œsophagus, the right bronchus, and the sympathetic nerve of the right side, which was irritated but not paralyzed; the right pupil was consequently dilated, not contracted. STEWART, *Edinb. Med. Jour.*, December, 1870, p. 555.

—— Two cases of arch of aorta involving pressure on left recurrent laryngeal nerve. MACKENZIE, *Trans. Path. So. London*, xxi., 1870, p. 129.

—— Of arch of aorta, proving fatal by pressure on left recurrent nerve; irregular origin of the large vessels. PEACOCK, with lithograph, *Trans. Path. So. London*, xxi., 1870, p. 134.

—— The diagnosis of aneurism of the aorta by the aid of the laryngoscope. JOHNSON, *Brit. Med. Jour.*, December 23, 1871, p. 720.

ANOSMIA.—Loss of smell from local etherization in performing of experiments. A case in *Virch. Arch.*, iv., 41, 1867. *Syd. So. Bienn. Retrosp.*, 1867–8.

—— Cases illustrating the physiology and pathology of the sense of smell. OGLE, *Med. Chir. Trans.*, London, 1870, p. 263, with several other references. Abstract in *Brit. Med. Jour.*, February 12, 1870, p. 66.

—— Recherches sur la perte de l'odorat. NOTTA, *Arch. Gén.*, April, 1870, p. 388.

ANOSMIA.—Case of, occurring after a blow on the occiput. HAMILTON, *Am. Journ. Med. Sci.*, April, 1871, p. 418; refers to case in same journal, April, 1870, p. 537.

APHONIA.—Curious case produced by fright, in a woman at seventh month of pregnancy. BOIVIN, *Am. Jour. Med. Sci.*, vol. vi., p. 220.

—— Intermittent. RENNES (*Arch. Gén.*, June, 1829), *Am. Jour. Med. Sci.*, vol. vi., p. 222.

—— Intermittent. 30 years' duration. OLLIVIER (*Arch. Gén.*, June, 1829), *Am. Jour. Med. Science*, vol. vi., p. 222.

—— from bayonet wound of pharynx; pressure of retained point on laryngeal branch of par vagum. Instantaneous restoration of voice on removal. LARREY (Case IV.), *Am. Jour. Med. Sci.*, vol. viii., p. 514. See Case V., *ibid.*, Tracheotomy, death.

—— Loss of voice from inclusion of the par vagum in a ligature of the carotid artery in a case of attempted suicide. HORNER, *Am. Jour. Med. Sci.*, vol. x., p. 403.

—— Cases dependent on an affection of the head. WEBSTER (*London Med. & Phys. Jour.*, Oct., 1832), *Am. Jour. Med. Sci.*, vol. xii., p. 221.

—— Case of cure by smoking mercurial cigarettes. NEVINS, *Am. Jour. Med. Sci.*, April, 1859, p. 541.

—— Studien und Beobachtungen über Stimmband-Lähmung. GERHARDT, Berlin, 1863.

—— Following phrenesia potatorum. *Deutsche Klinik*, 1866, p. 56.

—— in Bright's disease. WALDENBURG, *Deutsche Klinik*, 1866, p. 214.

—— Simulating laryngeal phthisis. Cure by galvanism. This power of restoration of voice explains the pretended cures of laryngeal phthisis. KRISHABER, *Gaz. hebd.*, 1868, No. 42, p. 661.

—— Electro-puncture in obstinate cases. MACKENZIE. See an article in *The Practitioner* for March, 1869, p. 148.

—— from laryngeal paralysis. MACKENZIE, *Med. Times & Gaz.*, April 3, 1869, p. 356.

—— from paralysis of cords. KNIGHT, *Boston Med. & Surg. Jour.*, Feb. 25, 1869.

—— Etudes médicales sur le Mont-Doré. Neuvième mémoire de la cure thermale du Mont-Doré dans le traitement des affections chroniques du larynx et en particulier de l'aphonie. G. RICHELOT, Paris, 1869.

—— Treated by Galvanism. MARCET (*Trans. Clin. So. London*, 1868), *Am. Jour. Med. Sci.*, Oct., 1869, p. 472.

—— Chief causes of hoarseness and aphonia, with hints on treatment. GEO. JOHNSON, *Med. Times & Gaz.*, Jan. 15, 1870, p. 60.

—— Treatment by external manipulation. .Cases, etc. OLIVER, *Am. Jour. Med. Sci.*, April, 1870, p. 305.

—— from blow upon larynx. LE GROS CLARK'S *Lectures on Surgical Diagnosis*, 1870, p. 229.

ALUM.—Insufflation of, in angina tonsillaris, variolous angina and œdema of the glottis. LÆNNEC (*Rev. Méd.*, Oct., 1825), *Am. Jour. Med. Sci.*, vol. iv., p. 500.

ALUM.—Lozenges of, instead of gargles, in throat affections; made up with sugar, tragacanth, and dilute laurel-water. *Am. Jour. Med. Sci.*, Jan., 1860, p. 219.

CANCER.—Cancer du larynx. *Arch. Gén.*, 1870, p. 234.

—— of larynx. ROB'T HAMILTON says there are no distinguishing characters to enable one to pronounce at once upon the nature of the growth in the soft ulcerative forms of cancer, such as of the uterus, pharynx, etc. Illustrated by specimens of tongue, larynx, etc. *Liverpool Med. & Surg. Rep.*, October, 1870. *Ranking's Abst.*, January, 1871.

—— Primary cancer of larynx. DESORMEAUX (*Gaz. hebd.*, 1870, No. 28), *Ranking's Abst.*, January, 1871, p. 189.

CAROTID.—Ulceration of carotid artery from cervical tumor. Adénite suppurée du cou. Ulcération de la carotide primitive et de la carotide externe. Hémorrhagie. Mort. VERNEUIL for DAUVÉ, *Gaz. des hôp.*, August 30, 1870, p. 388.

CARTILAGE.—Cartilaginous tubes. Le rôle physiologique des tubes cartilagineux; trachée-artère, trompe d'Eustache, et portion cartilagineuse du conduit auditif. PRAT. *Gaz. hebd.*, 1869, No. 6, p. 93. *Gaz. Méd. Paris*, 1869, No. 11, p. 139. *La France Méd.*, 1869, No. 10, p. 76.

—— Cicatrization des cartilages. Régénérations animales; LEGROS, Experiments on trachea of animals, etc. *Gaz. Méd. Paris*, 1869, No. 6, p. 75.

—— Fibroid degeneration of cartilages of larynx. MACKENZIE, *Trans. Path. So. London*, xxi., 1870, 58, illustrated.

CATHETERIZATION.—Catheterism of larynx. *Ueber d. Katheterismus d. Larynx.* WEINLEICHNER, *Jahrb. f. Kinderkr.*, N. F. iv., 1, p. 69.

CATARRH.—Catarrh des Larynx als Symptom des chronischen Morbus Brightii. SCHUSTER, *Deutsche Klinik*, 1866, p. 185.

—— Laryngeal. Treatment of, GERHARDT; *L'Union Méd. de la Gironde*, 1867, p. 534.

—— Rhinitis. Ueber chronischer Rhinitis und Folgen derselben. UHLENBROCK, *Deutsche Klinik*, 1869, pp. 193, 213, 232.

—— Chronischer Rachenkatarrh; Schlingbeschwerden in Folge von Parese des Gaumensegels; Heilung durch den Inductions-Strom. HOFMAN, *Memorabilien*, xiv., 8, 1869.

—— Of the form known as Hay Asthma. BINZ publishes a letter from HELMHOLZ, as to the value of local injections of muriate of quinia. *Practitioner*, November, 1869.

—— Notes of a lecture on Hay Fever. THOMPSON, *Brit. Med. Journ.*, January 21, 1871, p. 58.

CLEFT-PALATE.—Staphylorraphy. WARREN, *Am. Jour. Med. Sci.*, iii., p. 1.

—— Staphylorraphy. DIEFFENBACH, *Am. Jour. Med. Sci.*, iii., p. 471.

—— Staphylorraphy. Case followed by death. Angina said to be a common sequel, *Am. Jour. Med. Sci.*, vii., p. 545.

—— Staphylorraphy. HOSACK, *Am. Jour. Med. Sci.*, xii., p. 556.

—— Uranoplasty. HERMANN, *Gaz. Méd. Paris*, 1867, p. 782.

—— Staphylorraphy. Influence of vocal exercises on the results of. TRELAT. *Gaz. hebd.*, 1867, p. 125.

CLEFT-PALATE.—SARAZIN. *Gaz. Méd. Strasbourg*, 1868, p. 225.

—— Uranoplasty. EHRMANN, Considérations pratiques sur l'uranoplastie, *Gaz. Méd. Strasbourg*, 1868, p. 21.

—— Uranoplasty. BILLROTH'S case, *Woch. k. k. Gaz. Wien*, 1868, p. 417.

—— Uranoplasty. HEIBERG, Fall von Uranoplastik u. Staphylorraphie, *Norsk. Mag.*, 2. R. xxii., 7, Ges. Bern, p. 172.

—— Uranoplasty. WHITEHEAD, *Am. Jour. Med. Sci.*, July, 1868, Oct., 1868.

—— Uranoplasty. Beiträge zur Uranoplastik, BRYK, of Krakau (*Oesterr. Zeitsch. f. prakt. Heilk.*, xiv., 1, 2, 3, 4, 7, and 8, 1868), *Schmidt's Jahrb.*, 1869, Bd. 142, No. 1, p. 74.

—— Cure of, in children by operation, with description of an instrument for facilitating the operation. SMITH, *Am. Jour. Med. Sci.*, April, 1868, p. 541.

—— Restoration of articulation in, by artificial palates. SUERSEN, *Med. Times and Gaz.*, Jan. 16, 1869, p. 75.

—— Observations on the operations for, with cases. ANNANDALE, *Edinb. Med. Jour.*, April, 1869, p. 869.

—— Surgical treatment of cleft of hard palate, with cases. WHITEHEAD, *N. Y. Med. Jour.*, April, 1869, p. 1.

—— Operation for, on a girl five years of age. ADAMS, *Lancet*, June 12, 1869.

CIGARETTES.—Mercurial. Formula for. NEVIUS, *Am. Jour. Med. Sci.*, April, 1869, p. 539. Their use in aphonia, diseases of nasal passages, frontal sinuses, etc.

CORYZA.—Inhalation of fumes of opium in. *Am. Jour. Med. Sci.*, July, 1855, p. 207.

—— Glycerine in. STILLE'S, *Therapeutics*, 1868, vol. i., p. 132.

—— Camphorated and etherized vapors of tar in. *La Tribune Méd.*, 1868, p. 571.

—— of children. SIMON, On Coryza and the Catarrh of children. *Journ. f. Kinderkr.*, li. [xxvi., 11 and 12], p. 337, Nov. and Dec., 1868.

—— Inhalation of Sulphur in, spoken of by Avicenna, "restringit coryzam suffumigatio." POPHAM, On the Employment by the ancients of the vapors of sulphur as a disinfecting and curative agent, *Dub. Quart. Jour. Med. Sci.*, May, 1869, p. 489.

—— Mittel gegen den Schnupfen. VON HAGER, Morphia Æther piceo-camphoratus, seu Tinctura antecoryzea spirabilis (*Pharmac. Centr. Halle f. Dent.*, 1868), *Memorabilien*, May 31, 1869, p. 44.

—— Syphilitic. LANCERAUX on Syphilis, *Syd. Ed.*, 1869, vol. ii., p. 147.

CRICOID.—Cricoid Cartilage. Complete division of, and œsophagus. CUTTING, *Am. Jour. Med. Sci.*, Jan., 1853, p. 95.

—— Primary caries of, with secondary abscess. MACKENZIE, *Trans. Path. So. London*, xxi., 1870, p. 46, with cuts of laryngoscopic appearances.

—— Large tumor removed from posterior surface of. MACKENZIE, *Trans. Path. So. London*, xxi., 1870, p. 53, with cuts of laryngoscopic and microscopic appearances.

—— Secondary disease of, from post-œsophageal abscess. MACKENZIE, *Trans. Path. So. London*, 1870, p. 56.

CROUP.—Efficacy of tobacco in. CHAPMAN, *Am. Jour. Med. Sci.*, vol. i., p. 477.

—— Observations by J. R. COXE, *Am. Jour. Med. Sci.*, vol. iii., p. 56.

—— JADELOT'S treatment of. *Am. Jour. Med. Sci.*, vol. iii., p. 207.

—— LEY on Croup, etc. London, 1836. An essay on the Laryngismus Stridulus, or croup-like inspiration of infants, etc.

—— Observations on the Pathology of Croup, etc. GREEN, New York, 1849.

—— in adult. Specimen. JACKSON, *Am. Jour. Med. Sci.*, April, 1853, p. 363.

—— Cure by Steam. STORER, *Am. Jour. Med. Sci.*, April, 1853, p. 359, *ibid.* April, 1858, p. 352.

—— Cases treated with arg.-nit. *Am. Med. Jour. Med. Sci.*, April, 1854, p. 346.

—— Cases treated successfully with pot. iod. GRISCOM, *Am. Jour. Med. Sci.*, July, 1854, p. 286.

—— fatal case at 15 months. Specimen. *Am. Jour. Med. Sci.*, Oct., 1854, p. 346.

—— PEASLEE, Monograph. Review. *Am. Jour. Med. Sci.*, April, 1855, p. 472.

—— TROUSSEAU, Tracheotomy in. *Am. Jour. Med. Sci.*, July, 1853, p. 237.

—— NEWMAN, prize essay on. *Am. Jour. Med. Sci.*, Jan., 1856, 103.

—— MARTYN, severe inflammatory. *Am. Jour. Med. Sci.*, Jan., 1856, p. 210.

—— Sulphate of copper in. HONERKOPF, *Am. Jour. Med. Sci.*, April, 1856, p. 473, *ibid.* Oct., 1859, p. 538.

—— Belladonna and mercurial ointment locally in. *Am. Jour. Med. Sci.*, April, 1858, p. 340.

—— Glycerine in. MAYER, *Am. Jour. Med. Sci.*, April, 1858, p. 338.

—— Tepid solutions of sodæ chloras into trachea in. BARTHEZ, *Am. Jour. Med. Sci.*, Oct., 1859, p. 544.

—— Comparative results of treatment of, by tracheotomy and by medicature during the years 1854–8. BARTHEZ, *Am. Jour. Med. Sci.*, July, 1860, p. 231.

—— Anleitung zur Tracheotomie bei Croup. LISSÁRD, Giessen, 1861.

—— Ice-water in. MCFARLAND, *Am. Jour. Med. Sci.*, April, 1861, p. 607.

—— Movement cure in. Die naturgemässe Behandlung der häutigen Bräune. BECKER, Cassel, 1865.

—— Der Croup. PAULI, Würzburg, 1865.

—— Der Croup oder die häutige Bräune. STEINBACHER, Augsburg, 1867.

—— Insufflation of nitric acid in. *Gaz. hebd.*, 1867, p. 303, 418.

—— INMAN, advises moisture and warm temperature, *Liverpool Med. and Surg. Rep.*, vol. i., 1867, p. 17.

—— 33 cases of tracheotomy in. *Gaz. Méd. Strasbourg*, 1867, p. 295.

—— Cases of, tracheotomy, lime-water, etc. *Gaz. Méd. Strasbourg*, 1868, p. 106, 171.

—— Treatment by inhalation of moist vapors of sulphuret of mercury. ABEILLE, *Gaz. Méd. Paris*, 1867, pp. 527, 569, 582, 598.

—— BRÉGEANT, *ibid.*, 1868, p. 80.

—— fatal case in a boy æt. 15 years. MIDDLETON, *Am. Jour. Med. Sci.* Jan. 1868, p. 120.

—— fatal case in. PRENTISS, *Am. Jour. Med. Sci.* April, 1868, p. 412.

—— cases with result of operations, *Gaz. hebd.*, 1868, p. 311, 361, 442.

Croup.—Bromine in. Ozanam, *Am. Jour. Med. Sci.*, April, 1868, p. 536.

—— Bromine in. *Medical Record*, vol. iii., p. 440.

—— Jacobi on. *Am. Jour. Obstet.*, May, 1868. *Am. Jour. Med. Sci.*, Oct. 1868, p. 587.

—— Etude sur le croup après la trachéotomie. Sanne. Paris, 1869.

—— Acetate of potash in large doses, ʒ ij in eau sucré in 24 hours; produces a slight cough, facilitating expectoration of membranes. Labat (*Journ. de Méd. Bordeaux*) *Practitioner*, June, 1869, p. 377.

—— Injections of lime-water, by Pravaz' syringe inserted between rings of trachea. Albu of Berlin, *Berlin Klin. Woch.* 1869, No. 5, note. *Union Méd. Bulletin Gén. de Thérap.*, July 30, 1869, p. 91.

—— Formation of râle in croup. Genesis des "Cliquetis" genannten Geräusches beim diphtheritischen Croup. Küchenmeister, *Berlin Klin. Woch.*, No. 2, 1870. *Wein. Med. Woch.*, March 12, 1870, No. 18, p. 287.

—— A. Weber, of Darmstadt, finds lactic acid useless; also lime-water. *Wien. Med. Woch.*, *Beilage zu*, No. 20, 1870.

—— Pathology of. Fibrinous exudation solidified by presence of carbonic acid. See experiments of B. W. Richardson, *Lancet*, Sept. 24, p. 438.

—— De Croup und seine Behandlung durch Glycerininhalationen. Strehberger, Mannheim, 1870.

—— Specimen of croupal false membrane from tracheal bifurcation to epiglottis. Porter. Doubts expressed by Society whether not diphtheria, *Tran. Path. So. London*, xxi., 1870, p. 445.

—— Quinine in; Retrospect in *Am. Journ. Med. Sci.*, April, 1871, p. 598.

Cough.—Hysterical and spasmodic, *Am. Jour. Med. Sci.*, July, 1854, p. 232.

—— On cough. Semple, London, 1858.

—— On winter cough. Dobell, London, 1866.

—— study of, Nothnagel, *Allg. Med. Cent-Zeitg.*, October 17, 1868, p. 720. *Gaz. hebd.*, 1868, 813, Virch. *Arch.* 44, B. 1. H.

—— Der hysterische Krampfhusten. Theodor, Greifswald, 1868.

—— from foreign body in ear. Toynbee, *Diseases of the Ear*, London, 1868, p. 39.

—— On the physiology of Ear-cough. Clarke, *Brit. Med. Jour.*, January 15, 1870, p. 51.

—— Ear-cough. Bush, *ibid.* p. 53.

—— fracturing 10th rib a little anterior to tubercle, in a pregnant woman æt. 53 years, with a relaxed uvula. Miall, *Brit. Med. Jour.*, January 7th, 1871, p. 8.

Deafness.—From syphilitic ulcers of pharynx. (Van Swieten and others quoted.) Lanceraux, on syphilis, vol. ii., p. 112; also from destruction of bones and other venereal sequelæ.

—— On throat deafness. Yearsley, 11th Edit. London, 1868.

Deglutition.—Sur l'usage de l'épiglotte dans la déglutition. Majendie, reference to, in *Am. Jour. Med. Sci.*, vol. viii., p. 228.

—— Rheumatic affection of maxillary articulation sometimes preventing deglutition. Fahnestock's liniment in, *Am. Jour. Med. Sci.*, vol. xi. p. 60.

Deglutition.—Autolaryngoscopic observations on the mechanism of deglutition. Krishaber, *Union Méd.* 1865, 64.

—— Autolaryngoscopic observations in deglutition. Guinier, *Gaz. des hôp.* 1865, 59, *Gaz. hebd.*, 1865, 22, 31.

—— Deglutition, on. Moura, *Gaz. hebd.*, 1867, pp. 221, 582.

—— Jugglery, etc. *Med. News & Lib.*, 1868, p. 143.

—— Le nouveau dictionnaire de médecine et les expériences autolaryngoscopiques de Guinier de Montpellier. *Gaz. hebd.*, 1869, p. 342.

—— L'acte de déglutition, son mécanisme. Moura, Paris, 1869.

—— Deglutition; action of sensitive nerves in; allusion to experiments of Waller and Prévost. *Med. Times & Gaz.*, 1869, September 4, p. 286. *Jour. Psych. Méd.*, April, 1871, p. 408 from *Arch. de Physiol.*, 1870.

Diphtheria.—The paralysis of, dependent upon lesion of the great sympathetic. Remak, *Berlin. Klin. Woch.*, 1854, No. 13.

—— Chlorine in, *Am. Jour. Med. Sci.*, April, 1859, p. 545.

—— Throat paralysis following; Reynolds, *Am. Jour. Med. Sci.*, July, 1850, p. 285.

—— Creasote locally in, *Am. Jour. Med. Sci.*, April, 1861, p. 608.

—— Diphtheria; its nature and treatment. Slade, Phil., 1861; being the dissertation to which the Fiske fund prize was awarded, July 11, 1860.

—— On the treatment of Diphtheria. Chapman, Boston, 1863.

—— Paralysis after. Moore, *Med. Press & Circ.*, 1866.

—— Case of, by inoculation. Paterson, *Gaz. Méd. Paris*, 1867, p. 647.

—— Paralysis, consecutive to a wound. *Gaz. hebd.*, 1867, p. 14.

—— Its nature, and the consecutive paralysis. Thoresen, (*Jour. f. Kind.*, 1866, *No.* 9 & 10), Rev. in *Gaz. Méd. Strasbourg*, 1867, p. 259.

—— Paralysis of palate, diaphragm, and posterior muscles of neck; rapidly cured by strychnine and electricity. *Gaz. hebd.*, November 22, 1867, p. 746.

—— Bromine in, *Med. Record*, vol. iii., p. 441.

—— Laryngoscopic examinations in, *L'Union Méd. Gironde*, October, 1868, p. 602.

—— Acidulated solution of pepsine as a solvent for false membrane in. Doughty, *Richmond & Louisville Med. Jour.*, 1868, p. 591.

—— Solubility of false membranes of. Bricheteau & Adrian, *Union Méd. Gironde*, August, 1868, p. 516.

—— Pharyngite pseudomembraneuse. Betheder, *Union Méd. Gironde*, July. 1868, p. 461.

—— Local use of sublimate. Betz, *Memorabilien*, 1868, p. 168.

—— Iodine inhalation in. Curran, *Lancet*, 1868, Oct. 16, No. 17.

—— Case of, with tracheotomy. Prentiss, *Am. Jour. Med. Sci.*, April, 1868, p. 412.

—— Treatment by cauterizations. Cambrellin, *Bulletin de l'Académie Royale de Médecine de Belgique*, 1868, p. 552.

—— Treatment by sulphur. Ullersperger, *Journal für Kinderkr.*, 1868, 26, 546, 5. & 6. *Memorabilien*, May 8, 1869, p. 21.

DIPHTHERIA.—Treatment by balsam of copaiba and cubebs. On the principle of their properties in drying up sources of mucous secretions, therefore so useful in catarrhal affections, especially of the adynamic and gangrenous varieties. TRIDEAU, *Brit. and For. Med. Chir. Rev.*, Oct., 1868. *Ranking's Abst.*, 1869, p. 110.

—— Treatment by flowers of sulphur. BARBOSA, Lisbon, 1868. Rev. in *Gaz. Med. Paris*, 1869, p. 271.

—— of larynx, treatment of. Zur Behandlung d. Kehlkopfdiphtheritis. ALBU, *Berl. klin. Woch.*, vi. 5., p. 50, 1869; again *Deutsche Klinik.*, 1869, No. 31, p. 290.

—— Anatomy of. La diphthérite et le croup du pharynx et des voies aériennes au point de vue anatomique. WAGNER. Translated from *Arch. der Heilkunde*; *Gaz. Méd. Paris*, 1869, No. 29, p. 393.

—— Fungus of. LETZERICH, in *Virchow's Archiv*, 1869, xlv. 327–333, and xlvi. 229–233, says the membranes are due to a fungus (*zygodesmus fuscus*) developed on the surface of the mucous membrane, and in its tissue.

—— Parasitic nature of. LOEWINSON and KLOTZCH, *Wien Med. Presse*, x. 19, 1869.

—— Hemiplegia of right side from. BOUCHUT, *Gaz. d. hôp.*, 102.

—— Paralysis from; cases. EASTON, *Glasgow Med. Jour.*, N. S. Aug. 14, p. 453.

—— Strychnia in; Diphtherit. Lähmung d. Rumpfes, der Extremitäten, d. Fauces u. d. Nervi laryng. sup.; rasche Heilung bei Anwendung von Strychnia. LEUBE, *Arch. f. Klin. Med.*, vi., 2 a 3, p. 266.

—— Value of sulphur in. Apparently a fair exposition; entitled Die Epidemische Diphtheritis und deren schnellste Heilung. ALBAN LUTZ, Würzburg, 1870, pp. 62.

—— Relations with Scarlatina. METTENHEIMER, *Memorabil.* xiv. 8. THOMAS; LOUIS; *ibid.*, xiv. 9.

—— Nasal. ORR, SCOTT, GAIRDNER; cases. *Glasgow Med. Jour.*, May, 1869, p. 395.

—— and lime-water. KÜCHENMEISTER, *Allg. Med. Cent.-Zeitg.*, Feb. 5, 1870, p. 125 and Feb. 12, 1870, p. 150.

—— Sudden death during convalescence from. WHITE, *Med. Times & Gaz.*, April 30, 1870, p. 464.

—— Ueber die Beziehung der Rachen—Diphtherie zur Septhämie und Pyohämie. Prof. BILLROTH; a series, commencing No. 7, 1870. *Wien. Med. Woch.*

—— Uselessness of cauterizations. Dr. SCHULLER stated in the 48th *Versammlung Deutscher Naturforscher und Aerzte*, that he had entirely abandoned cauterization of the pharynx, larynx, and conjunctiva in diphtheria. In numerous cases he had, as an experiment, cauterized only one side of the fauces, and he had always been led to the same conclusion:—1st, That the membrane remained attached longer on the side which had been cauterized than on the other; 2d, that even the most energetic application of nitrate of silver failed to arrest the reproduction, or to prevent the extension of the membrane; 3d, in

some cases, serious tumefaction and inflammation of the cervical lymphatics followed the application of the caustic. In these views he was supported by Ebert, Stiebel, Cohen, Rinecker and others, who directed the use of small bits of ice to be constantly allowed to melt in the mouth, and employed a gargle of chlorate of potash, alcohol, permanganate of potassa, carbolic acid, etc. *The Med. Times*, Feb. 1, 1871, p. 166.

DIPHTHERIA.—After excision of tonsils, etc.; fatal; specimens. **HESLOP**, *Brit. Med. Jour.*, March 25, 1871, p. 323.

DYSPHAGIA.—From displacement of hyoid bone. **MUGNA**, *Am. Jour. Med. Sci.*, vol. iv., p. 483.

—— New method of treating some forms of. **MACKENZIE**, *Gaz. Méd. Paris*, 1867, p. 533.

—— The treatment of rawness of tongue and painful deglutition in advanced phthisis. POWELL, *Lancet*, 11, 25 December, 1868.

—— of 18 years' standing, cured by one insertion of stomach-tube. LE GROS CLARK'S *Lectures on Surgical Diagnosis, etc.*, 1870, p. 243.

EPIGLOTTIS.—On the anatomical structure of, in the new-born. **MAINGAULT** (*Arch. Gén.*, April, 1829), *Am. Jour. Med. Sci.*, vol. v., p. 189.

—— Case of attempted suicide, with danger of suffocation from falling down of the epiglottis. HOUSTON (*Dublin Hosp. Repts.*, vol. v.), *Am. Jour. Med. Sci.*, vol. viii., p. 229.

—— Loss of portion of by gunshot wound. Swallowing, etc., good in 18 days. LARREY (Case VI.), *Am. Jour. Med. Sci.*, vol. viii., p. 514.

—— Loss of entire epiglottis. *Ibid.* (Case VII.). *Ibid.*, p. 515.

—— Polypus of; spontaneous separation. **SYME**, *Am. Jour. Med. Sci.*, April, 1854, p. 515.

—— Anomaly of, in patient dead from cholera. Epiglottis entirely missing, without any other physiological alteration. No evidences were presented during life. EBERTH (*Virch. Arch.*, April, 1868), *Gaz. hebd.*, 1868, p. 477.

—— LUSCHKA (Reichert and Du Bois-Reymond's *Arch.*, 1868, p. 224) describes and pictures a mus. hyo-epiglotticus in the ox, and a m. genio-epiglotticus in man, which consists of the genio-glossi muscles that do not terminate in the tongue, but pass backwards to the middle glosso-epiglottic ligament.

—— Case of tuberculosis in which the epiglottis became detached by ulceration. *Penn. Hosp. Rep.*, vol. ii., p. 307.

—— Complete loss of, from tuberculous ulceration. **TYSON** for **CORSON**, *Am. Jour. Med. Sci.*, April, 1869, p. 397.

—— Position of, in the aged. GIBB, *Med. Times and Gaz.*, 1869, p. 293.

—— Position of, in the Jews. GIBB, *ibid.*

—— Defect of. EBERTH (Virchow's *Arch.*, xliii. per *Centbl. Med. Wiss.*, April 13, 1869), *Am. Jour. Med. Sci.*, April, 1870, p. 527.

—— Large sarcomatous growth removed from under surface of. **MACKENZIE**, *Trans. Path. Soc. London*, xxi., 1870, p. 513, cuts.

EPISTAXIS.—Obstinate case, after plugging; bleeding from lachrymal puncta. *Am. Jour. Med. Sci.*, vol. vii., p. 526.

—— Treatment of. REVEILLE-PARISE. *Am. Jour. Med. Sci.*, Jan. 1853, p. 231.

—— Obstinate case, yielding to a mouthful of salt. *Am. Jour. Med. Sci.*, April, 1858, p. 390.

—— And mode of arresting. THOMPSON. *Brit. Med. Jour.*, 1867.

—— M. FANO, Paris, ties four or five pledgets to the nasal end of the string of the tampon.

—— Tansy in. UHLE. *The Med. Record*, vol. ii., p. 466.

ERYSIPELAS.—Cases proceeding from eczema of nose; cases proceeding from herpes of throat. TROUSSEAU. *Clin. Med.*, Sydenham So. Edit., vol. ii., p. 255.

—— Syphilitic erysipelas, commencing in the ulcerated pharynx, and spreading to the face by the ears or nasal fossæ. LANCEREAUX. *Syphilis*, 1869, vol. ii., p. 130.

FALSE MEMBRANES. Lactic Acid in. *Practitioner*, Nov., 1868.

—— Action of chlorates of soda and potash on. BARTHEZ. *Am. Jour. Med. Sci.*, Oct. 1858.

—— OZANAM, CH.—Mémoire sur les dissolvants et les désagrégeants des produits pseudo-membraneux et sur l'emploi du brome dans les affections pseudo-membraneuses. Paris, 1869.

FISTULE OF LARYNX.—Fistulous opening of larynx, Operation. COOPER, *Am. Jour. Med. Sci.*, vol. i., p. 467.

—— Fistulous ulcer in front of larynx. WATSON, (*Am. Med. Times*, June 2, 1860); *Am. Jour. Med. Sci.*, July, 1860, p. 279.

—— Fall von angeborner Halsfislet. KOCH, *Monatschr. f. Geb.*, March, 1867, p. 161.

—— HAMILTON'S 10th case of bursal tumors. *N. Y. Med. Jour.*, Jan., 1870, p. 54.

—— DR. J. H. POOLEY'S case. *Ibid.*, p. 55.

FOLLICULAR disease of pharynx at same time with acne, showing simultaneous inflammation of follicles of skin and mucous membrane of pharynx; due, in this case, to debility. *Jour. Cut. Med.*, Sept., 1870, p. 132.

FORCEPS.—Modification of Cuzco's straight, curved for tracheal tube; with chain joints, etc., for œsophagus; with cuts. *Bul. Gén. de Thérap.*, May 15, 1869; also *Med. Times and Gaz.*, June 19, 1869, p. 672.

FOREIGN BODIES IN AIR-PASSAGES.—Death of Anacréon and Pope Adrien. "La morte du poëte Anacréon a été occasionée, paraît-il, par l'arrêt d'un pepin de raisin dans l'un des ventricules; et celle du pape Adrien par une mouche qui s'etait logée dans le même endroit du larynx." MOURA, *L'acte de la Déglutition, son Mécanisme.* Paris, 1867, p. 14.

—— External use of tobacco in. GODMAN, *Am. Jour. Med. Sci.*, vol. ii., p. 480.

—— Bone lodged for 48 days in the trachea of an infant. STABB, *Am. Jour. Med. Sci.*, vol. vi., p. 251.

FOREIGN BODIES IN AIR-PASSAGES.—Coin in bronchia remaining ten years before producing death. *Am. Jour. Med. Sci.*, vol. vi., p. 518.

—— Bone in bronchia producing pulmonary abscess. Autopsy. GILROY, *Edinb. Med. and Surg. Jour.*, April, 1831; *Am. Med. Jour.*, vol. viii., p. 513; also BROUSSAIS (Case LIII.), chronic phlegmasiæ.

—— A practical treatise on foreign bodies in the air-passages. Prof. S. D. GROSS, Philadelphia, 1854.

—— A grain of coffee fatal after remaining 8¼ years. PEPPER, *Am. Jour. Med. Sci.*, April, 1855, p. 563.

—— Suffocation from food in rima. PORTER, *Dub. Med. Press*, Feb. 9, 1859. *Am. Jour. Med. Sci.*, April, 1859, p. 563.

—— Regurgitation. Experiments of ENGEL; case of death from this cause. Could it not have been a post-mortem occurrence? *Woch. d. Zeits. d. g. A. Wien*, 1866, No. 31; *Gaz. Méd. Strasbourg*, 1867, p. 233.

—— T. BERTHOLLE, Des corps étrangers dans les voies aériennes. Mémoire couronné par l'Académie Impériale de Médecine. Delahaye, Paris, 1867.

—— MERKEL's Bericht über Laryngoskopie. *Schmidt's Jahrb.*, Bd. 138, No. 5, p. 230.

—— Plate with 3 artificial teeth as a foreign body in the larynx. Recognized and removed by laryngoscopy. OERTEL, *Berl. Klin. Woch.*, iv. 11, 1867.

—— Expectoration of a Minié ball. *Gaz. hebd.*, 1867, p. 528.

—— Transactions Indiana State Med. So., 1867, p. 70. WEIST.

—— Regurgitation of chyme. Death. PARROT, *Gaz. hebd.*, 1868. p. 489; also *Ranking's Abst.*, 1869, p. 83, from *l'Union Méd.*, 1868, No. 91.

—— Bone removed from larynx by aid of laryngoscope. SCHRÖTTER, *Mediz. Jahrb.*, xv. Bd., 1. Heft, 1868, p. 61.

—— 300 cases. BOURDILLAT, *La Tribune Médicale*, March 29, 1868, p. 305; *Gaz. Méd. de Paris*, 1868, pp. 94, 121, 125, 180, 212.

—— Phenomènes morbides simulant la phthisie pulmonaire tuberculeuse; cessation des accidents et guérison complète à la suite d'une vomique et rejet du corps étranger. LABORDE, *Gaz. Méd. Paris*, 1868. No. 48, p. 701.

—— Treatment. Du traitement des corps étrangers des voies aériennes. An extract from the Dictionnaire Encyclopédique des Sciences Médicales. GUYON, *Bulletin Gén. de Thérapeutique*, Jan. 15, 1869, p. 15. A valuable article and reliable résumé, of which the following notes will show its desert of perusal. Aetius seems to have been the first to have transmitted precepts on this point. L'agitation, les efforts, l'expiration violente qui en résultent aurait pour effet habituel de chasser de corps étrangers au dehors (DALÉCHAMPS, *Chir. Franç.*, cap. xxxii., p. 130; annot. A. Paré, t. ii. p. 443; édit. Malg. Hévin mém. cit., p. 436). Sternutatories and syrups recommended by Fabrice de Hilden. Cases not influenced by position of Brodie, Lenoir, Duncan, Beneys (Malgaigne; *Journ. de Chirurg.* t. iii., pp. 51, 55, 83; *Rev. Méd. Chir.*, t. xi., p. 101); Hasford (*Rev. Méd. Chir.*,

t. vii. p. 362), Dupuytren, t. vi., p. 302. Note of R. Benoit (*Gaz. Méd.*, 1855, p. 38). In 1644 Frédéric Monavius recommended tracheotomy. Théophile Bonet and Willis soon had an opportunity, but did not approve of the operation. The autopsy revealed how readily it might have been done, etc. (Bonet, *de affectu pectoris*, lib. i., obs. 1; Willis, *Pharmaceutica rationalis*, Oxford, 1673). Operation performed (J. Ph. Verduc, *Pathol. de Chir.*, t. ii., p. 849, Paris, 1710). (Heister, *Inst. de Chir.*, t. iii., p. 449.) (Haller, *Opusc. pathol.*, Obs., 7.) (Wend, *Hist. de la trachéotomie*, Breslau, 1774.)

FOREIGN BODIES.—Ueber fremde Körper in den Luftwegen, mit bes. Bezieh. auf einen Fall von glücklicher Genesung nach längerer Anwesenheit eines Pflaumensteins im l. Bronchus. Inaugural dissertation. EDWARD HOLTZ, Stralsund.

—— Des sangsues considérées comme corps étrangers vivant dans les voies aériennes, et en particulier dans le larynx. RIDREAU. Several observations. *Gaz. Méd. de l'Algérie*, 1869, Nos. 1, 2, et seq.

—— Removal of, with aid of laryngoscope. FIEBER, *Wien. Med. Woch.*, xix., 86.

—— Regurgitation. Résumé of. FOVILLE, *Arch. Gén. de Méd.*, July, 1869.

—— Entfernung eines fremdes Körpers aus d. Larynx mit Hülfe d. Kehlkopfspiegels. FIEBER, *Wien. Med. Woch.*, xix. 86.

—— Impaction of a penny in larynx for six years. Laryngoscopic diagnosis and successful removal. PETRIE, *Brit. Med. Jour.*, Aug. 20, 1870, p. 186.

—— Goldpiece in larynx six years. Detection with laryngoscope and removal with forceps. CAMERON, *Liverpool Med. and Surg. Rep.*, iv., p. 180, October, 1870.

—— Knife-blade in chest twelve years. Spontaneous expulsion. SNYDER, *Chicago Med. Ex.*, July, 1870; *The Med. Times*, Dec., 1870, p. 86.

—— Pebble moving from right to left bronchus. Death in two months. Autopsy. LE GROS CLARK, *Lectures on Surgery*, London, 1870, p. 237. *Aliments.*—Food found in bronchi after death, six hours after injury to head by fall of earth, etc. LE GROS CLARK, *Lectures, etc.*, p. 235.

—— Suicidal suffocation by cotton wool in pharynx and larynx. MACKENZIE, *Trans. Path. So. London*, 1870, p. 42. See similar case in Günther's Lehre von den blutigen Operationen.

—— Shawl-pin in lungs for four years. HERRICK, *Boston Med. and Surg. Jour.*, Feb. 16, 1871, p. 108.

—— Canula in bronchus four years. MASING (*St. Petersb. Med. Zeit. Chr.*, 1869, Heft 7), translated by TUCK, *Boston Med. and Surg. Jour.*, Feb. 23, 1871, p. 128.

—— Suffocation mistaken for apoplexy. BARNES, *Brit. Med. Jour.*, March 25, 1871, p. 312. A man, æt. 67, was accidentally choked while eating an orange. Some time previously he had had an apoplectic fit, and the impression of his friends was that he had been seized with another. On opening the trachea, the piece of orange was found completely blocking up the entrance into the larynx.

FRACTURE OF LARYNX.—Cure; Penna. Hospl., *Med. Exam.*, April 25, 1838.

—— GIBB. *Brit. Am. Jour. & Provincial Med. & Surg. Jour.*, 1851, p. 20.

—— FORE AND WOOD. *Western Lancet*, and *N. Y. Jour. Med.*, vol. xv., p. 152.

—— TAYLOR's Medical Jurisprudence, p. 756.

—— HAMILTON's Treatise on Fractures, 1855.

—— WILSON. *Edinb. Med. Jour.*, 1855–6, p. 289.

—— KEILER, *ibid.*, p. 527.

—— with fracture of hyoid, &c. Tracheotomy, recovery. SAWYER, *Am. Jour. Med. Sci.*, Jan. 1856, p. 13.

—— MOUILLÉ. *Recueil de mémoires de méd.*, *de chir.*, *et de pharm. militaires.* 3 serie, 1861, p. 224. Fracture of larynx with large penetrating wound. Tracheotomy, cure, with movability of larynx.

—— On fractures of the larynx, and ruptures of the trachea. WM. HUNT. *Am. Jour. Med. Sci.*, April, 1866, p. 378.

—— Handbuch der Lehre von den Knochenbruchen, Zweiter Theil. i. Lieferung. E. GÜRLT, Hamm., 1864.

—— WALES. *Am. Jour. Med. Sci.*, 1867, No. i., p. 269.

—— HAMILTON, *The Medical Record*, vol. i., p. 507; *Am. Jour. Med. Sci.*, April, 1867, p. 567.

—— Fraktur der cartilago cricoidea. Hautemphysem. Tod. HÖGGMARK; *Hygea*, November, 1867. *Schmidt's Jahrb.*, No. ii., 1868. Bd. 40, p. 192.

—— Bruch d. Kehlkopfes; Hautemphysem; Dyspnœ, Tracheotomie; Tod durch mediastinales Emphysem, und sekundäre Perikarditis. *Wien. Med. Woch.*, xviii. 15.

—— Œdemá, tracheotomy, cure. MACLEAN, *Union Méd. Gironde*, April 28, 1868, p. 260.

—— Historical and critical Summary of Fractures of Larynx. HENOCQUE. *Gaz. hebd.*, 1868, Sept. 25 and Oct. 2.

—— Quelques considérations sur les fractures traumatiques du larynx, et leur traitement. FREDET, Paris, 1868.

—— Fracture of Larynx. Death. GAGNON, Fredet, *Gaz. des hôp.*, 1868, Nos. 90, 91; *Edinb. Med. Jour.*, Jan. 1869, p. 665; *Brit. & For. Med. Chir. Rev.*, Jan. 1869, p. 266.

—— Traumatic fractures of larynx. STOKES, *Dub. Quar. Jour. Med. Sci.*, May, 1869, p. 307, with case; illustrated.

—— Homicidal fracture of cricoid cart. PEMBERTON, *Lancet*, May 22, 1869.

—— Fracture du larynx; mort; autopsie. SERVIER, *Gaz. hebd.*, 1869, No. 7, p. 103; *ibid.*, No. 14, p. 222; *Am. Jour. Med. Sci.*, July, 1869, p. 251.

—— Considérations sur les fractures du larynx et leur traitement. FREDET RHELNANG, *Gaz. Méd. de Granada*, May 31, 1869. Bibl. in *Bul. de Thérap.*, August, 1869, p. 129.

—— Suicidal fracture. Specimen shown. STOKES, *Dub. Quar. Jour.*, May, 1870, p. 503.

FRONTAL SINUS.—Case of disease of. JAEGER, *Am. Jour. Med. Sci.*, vol. v., 203.

—— Case of fracture connected with, and exposure of frontal nerve. WELLS, *Am. Jour. Med. Sci.*, October, 1857, p. 553.

GALVANISM.—After tracheotomy for croup, to prevent suffocation. *Gaz. hebd.*, November 22, 1867, p. 746.

—— in Aphonia and other laryngeal affections. VON BRUNS. Die Laryngoskopie, &c. Tübingen, 1867, p. 234.

—— MACKENZIE. On the Laryngoscope. London, 1866, 1869, 1871.

—— MACKENZIE. Hoarseness, loss of voice, &c. London, 1868.

GALVANO-CAUTERY.—TÜRCK. Klinik der Kehlkopfkrankheiten. Wien, 1866, p. 579.

—— VOLTOLINI. Die Anwendung der Galvanokaustic im innern des Kehlkopfes und Schlundkopfes. Wien, 1867.

—— Galvano-caustische Schlinge zur Behandlung der Kehlkopf-polypen. *Berlin. Klin. Woch.*, 1869, p. 27.

—— in laryngeal growths, &c. SCHNITZLER, *Wochen-blatt.* Wien, 1868, No. 43, p. 393.

—— in laryngeal growths. PRINZ, *L'Union Méd. Gironde*, 1868, p. 94.

—— VON BRUNS. Die Laryngoskopie und die laryngoskopische Chirurgie. Tübingen, 1868, p. 244.

—— Galvano-caustische Schlinge zur Behandlung der Kehlkopf-polypen. *Berlin. Klin. Woch.*, 1869, p. 27.

—— in removal of laryngeal tumors. REICHEL. *Berlin. Klin. Woch.*, No. 51, 1869. *Practitioner*, March, 1870. *Am. Jour. Med. Sci.*, April, 1870, 554.

—— Bedeutung der Galvanokaustik für die Entfernung von Neubildungen aus dem Kehlkopf. Prof. BRÜHL. *Wien. Med. Woch.*, April 2, 1870, No. 21, p. 370.

—— Die Galvano-chirurgie, oder die Galvanokaustik und Elektrolysis bei chirurgischen Krankheiten. VON BRUNS; Tübingen, 1870.

GARGLING.— Étude du Gargarisme laryngien. H. GUINIER, Paris, 1868.

—— Ueber eine neue Methode Heilmittel auf den Schlund und Kehlkopf zu appliciren. MECKEL, *Memorab.*, Dec. 12, 1868, p. 202.

GOITRE.—Carbonate of Soda in. HUFELAND, *Am. Jour. Med. Sci.*, vol. ii., p. 438.

—— Definition of bronchocele. Cases, etc. LARREY, *Am. Jour. Med. Sci.*, vol. vi., p. 516.

—— Über die Cystengeschwülste des Halses. E. GURLT, Berlin, 1855.

—— in an infant which lived but a few hours. SIMPSON, *Am. Jour. Med. Sci.*, July, 1855, p. 192.

—— Exophthalmic; case. *Am. Jour. Med. Sci.*, July, 1855, p. 249.

—— Exophthalmic; case. BANKS, *Am. Jour. Med. Sci.*, Oct., 1855, p. 527.

—— Exophthalmic; case. TAYLOR, *Am. Jour. Med. Sci.*, July, 1856, p. 258.

—— Suffocating. BONNET, *Am. Jour. Med. Sci.*, April, 1856, p. 493.

—— Cysts of thyroid treated by cauterization. *Gaz. hebd.*, Nov. 1, 1867, p. 701.

GOITRE.—Exophthalmic; with gangrene of extremities. *Gaz. hebd.*, 1867, pp. 585, 779.

—— Extirpation of. *Gaz. hebd.*, 1867, p. 141.

—— Extirpation of. GREENE, *Am. Jour. Med. Sci.*, 1867, p. 283.

—— Epidemic. WORBE, *Gaz. hebd.*, 1869, p. 699.

—— Injections of iodine in parenchymatous bronchocele. LÜCKE (*Berlin. Klin. Woch.*, Dec. 28, 1868); *Brit. and Foreign Med.-Chir. Rev.*, 1868, p. 558.

—— Producing asphyxia in a new-born child. Weight, 41.6 grammes. HECKER (*Mon. f. Geburts*, xxxi., 2 and 3, 1868); *Schmidt's Jahrb.*, No. 7, 1868: also, *Le Mouvement Médical*, 1869, No. 30, p. 35.

—— On treatment. SCHINZINGER (Congress of German Naturalists and Physicians, 1868); *Med. Times and Gaz.*, Jan. 30, 1869, p. 124.

—— Treatment by cauterization with chloride of zinc. SEDILLOT (*Gaz. des hôp.*, 1868, No. 45); *Am. Jour. Med. Sci.*, Jan., 1869, p. 262.

—— Treatment by cauterization with chloride of zinc. MACKENZIE, *Am. Jour. Med. Sci.*, April, 1868, p. 547.

—— Same author, four cases. *Trans. Clin. So.*, London, vol. i., 1868; *Am. Jour. Med. Sci.*, Oct., 1869, p. 468.

—— Iodide of ammonium in. WARING-CURRAN, *Med. Press and Circ.*, June 9, 1869.

—— Interstitial injection of chloride of zinc. RICHET, *Gaz. des hôp.*, July 24, 1869.

—— In Savoy. Use of iodine lozenges, etc. *Med. Times and Gaz.*, Oct. 23, 1869, p. 505.

—— With cancer of thyroid. Aphonia among other symptoms. Left lobe had pressed on recurrent nerve, etc. PAYNE, *Med. Times and Gaz.*, Dec. 3d, 1870, p. 660.

—— Exophthalmic. CHISHOLM, *Phil. Med. Times*, Oct. 15, 1870, p. 21.

—— Pendulous pedunculated bronchocele successfully removed. BLACKMAN, *Am. Jour. Med. Sci.*, Jan., 1870.

—— A case successfully treated by electrolysis and subcutaneous injections of iodine. WALTUCH, *Med. Times and Gaz.*, Jan. 28, 1871, p. 96.

—— Case of removal. PANCOAST, *The Med. Times*, April 15, 1871, p. 257.

—— Three cases successfully removed. GREENE, *Am. Jour. Med. Sci.*, Jan. 1871, p. 80.

—— Case of bronchocele causing urgent dyspnœa. Operation. Recovery. HAYES. In this case the operation consisted in dividing the tense cervical fascia over the tumor, and, on another occasion, the sterno-hyoid and sterno-thyroid muscles, exposing the gland, and affording such relief that the patient, a female æt. 18, could lie down with perfect comfort. The tumor gradually diminished from the size of half a fair-sized melon to that of a very small orange.

GROWTHS IN THE LARYNX.—Case of sudden death from obstruction of larynx, caused by a tumor deemed syphilitic. SENN, 1826. (*Journ. de Progrès*, vol. xvii.); *Am. Jour. Med. Sci.*, vol. vi., p. 223.

GROWTHS IN THE LARYNX.—Case of sudden death from polyp. . DUPUYTREN, *Am. Jour. Med. Sci.*, vol. vi., p. 518.

—— Histoire des Polypes du Larynx. EHRMANN, C. H. Strasbourg, 1850.

—— Spontaneous separation of a polypus of the epiglottis. SYME, *Month. Jour. Med. Sci.*, Oct., 1853.

—— On the surgical treatment of morbid growths within the larynx. GURDON BUCK, *Trans. Am. Med. Ass'n.*, Philadelphia, 1853.

—— Cancer of larynx. PAGET. Lectures on tumors. London, 1853, p. 428.

—— discovered after death. GEOGHEGAN, *Am. Jour. Med. Sci.*, Jan., 1855. p. 247.

—— On the surgical treatment of polypi of the larynx; and œdema of the glottis. HORACE GREEN, N. Y., 1859.

—— Die erste Ausrottung eines Polypen in der Kehlkopfshöhle durch Zerschneiden ohne blutige Eröffnung der Luftwege, etc. VON BRUNS, Tübingen, 1862.

—— Polypes du larynx et de la trachée-artère reconnus au moyen du laryngoscope et extirpés par les voies naturelles. OZANAM, *Gaz. Méd. Paris.* Acad. des Sc., Seance Juin 22, 1863, sheet 441.

—— On the throat and windpipe. GIBB, London, 1864.

—— Die Laryngoskopie und die laryngoskopische Chirurgie. Mit einem Atlas von acht Tafeln. VICTOR VON BRUNS, Tübingen, 1865.

—— Laryngoscopal surgery illustrated in the treatment of morbid growths within the larynx. L. ELSBERG, Philadelphia, 1866. Being the prize essay to which the American Medical Association awarded the gold medal for MDCCCLXV.

—— Operative Bezeigungen. Use of a silver lancet. MERKEL, *Deutsche Klinik*, 1866, p. 262.

—— Division of larynx to remove foreign growths. DURHAM, *Guy's Hosp. Rep.*, 1866.

—— Klinik der Krankheiten des Kehlkopfes und der Luftröhre, etc. LUDWIG TÜRCK, Wien, 1866.

—— Clinical study of congenital and infantile. DUFOUR, March, 1866, p. 273.

—— Étude sur les Polypes du Larynx chez les enfants, et en particulier sur les polypes congénitaux. A. CAUSET, Paris, 1867.

—— Die Anwendung der Galvanokaustik im innern des Kehlkopfes und Schlundkopfes, etc. R. VOLTOLINI, Wien, 1867.

—— Extirpation of fibro-epithelial neoplasm from vocal cords. CUTTER, *Am. Jour. Med. Sci.*, Jan., 1867, p. 138.

—— Removal of fibro-plastic tumor from vocal cords. OLLIVER, *Am. Jour. Med. Sci.*, July, 1867, p. 115.

—— On tumors. *Gaz. hebd.*, 1867, p. 304.

—— Extirpation of tumors. *Gaz. hebd.*, 1867, p. 414, 634.

—— Fibrous, removed after tracheotomy. ROQUEFOUS, *Gaz. hebd.*, October 4, 1867, p. 634.

—— Removal of tumor. CUTTER, *Boston Med. & Surg. Journ.*, September, 1867.

GROWTHS IN THE LARYNX.—Removal from child æt. 4 years. GIRALDES, *Gaz. hebd.*, November 8, 1867, p. 716.

—— Laryngeal. *Gaz. hebd.*, 1867, p. 655.

—— Galvano-cautery in, with case. PRINTZ, *Arch. der Heilkunde*, 1867.

—— Multiple; thyreo-hyoid laryngotomie. FOLLIN, *Arch. Gén.*, February, 1867, p. 129.

—— Tracheotomy for laryngeal polyps. *Gaz. hebd.*, 1867, p. 716.

—— Tracheotomy for fibrous tumor. *Gaz. hebd.*, 1867, p. 634.

—— Étude clinique sur les polypes du larynx développés avant la naissance et dans la première enfance. DUFOUR, Paris, 1867.

—— Exposé d'un cas de polypes multiples du larynx, traités et guéris par la laryngotomie thyréo-hyoidienne. FOLLIN, Paris, 1867.

—— Extirpation of laryngeal polyps. FOURNIE, *Gaz. des hôp.*, 1867, 24.
Ueber Larynxgeschwülste. *Virch. Arch.*, xxxviii., 2. p. 202.

—— Cancroid der Taschen und Stimmbände, sowie der Morgagnischen Taschen, bei einem 3 jähr. Knaben. *Virchow's Arch.*, xliii., 1. p. 129.

—— Case of laryngeal polyp. BERGERON, *Union Méd.*, 49, p. 624.

—— History of seven cases of removal, *Med. Chir. Trans.*, vol. li., 1868.

—— Polyp. on lig. ary-epig. STÖRK, *Woch. d. Wien. Gesell.*, 1868, Nov. p. 417.

—— Dreiundzwanzig neue Beobachtungen von Polypen des Kehlkopfes. VON BRUNS, Tübingen, 1868.

—— Beitrag zur Behandlung der Kehlkopfneubildungen. NAVRATIL, ten cases, two of them bands across cords—very interesting. *Berliner Klin. Woch.*, 1868, Nos. 48, 49, 51.

—— KLEBS. Arch. f. Path. Anat. & Phys., etc., 1868.

—— Removal from ventricle, after section of thyroid cart. GUYON, *Gaz. hebd.*, vi., xvi., 34.

—— Removal from ventricle after laryngotomy. KRISHABER, *Gaz. des hôp.*, 103.

—— Laryngotomy for. MOURA, *Gaz. des hôp.*, 109.

—— NAVRATIL. Removal of polyp after section of larynx *Wien. Med. Woch.*, xix. 72.

—— Removal of polyp from ventricle after section of thyroid cart. TARTIVEL, *Union*, 103.

—— Syphilitic tumor in upper part of larynx. WILKS, *the syphilitic affections of the internal organs*, with plate. Quoted in LANCERAUX on Syphilis, 1869, vol. ii., p. 4.

—— Removal of, by laryngotomy. ATLEE, *Am. Jour. Med. Sci.*, April, 1869, p. 378.

—— Removal of tumors, two cancroids. TOBOLD, *Deutsche Klinik*, 1869, p. 28.

—— Case operated on by STÖRK with a tonsillotome-like écraseur, after failure by himself, Bruns, Türck, and others. *Wien. Med. Woch.*, 1869, No. 40, p. 676. The wire had not cut through growth, but broken.

—— Utility of laryngotomy in removal of growths. Four cases. BALASSA, *Wien. Med. Woch.*, Nov. 11th, 1869.

—— On division of the larynx for removal of foreign growths. SCHRÖTTER,

Allg. Med. C-Ztg., January 19 & 26, 1869; also *Med. Jahrb.*, *&c.*, *Wien.*, 1869, No. 2. Cuts. A fatal case recorded.

GROWTHS IN THE LARYNX.—Case of extirpation of an epithelioma by external incision of larynx. NAVRATIL, *Wien. Med. Woch.*, 1869, March 17. Cuts.

—— Schleimpolyp im Kehlkopf. Entfernung durch Laryngofission. NAVRATIL, *Wien. Med. Woch.*, 1869, September 8, 72, p. 1201. Cuts.

—— Extirpation eines Kehlkopfephithelioms durch Laryngofission. NAVRATIL, *Wien. Med. Woch.*, 1869, p. 365. Cut.

—— Extirpation of a tumor from vocal cords. JOHNSON, *Med.-Chir. Trans.*, li., p. 173.

—— Cases of extirpation of growths from larynx. TOBOLD, *Berl. Klin. Woch.*, vi. 3, p. 31, 4, p. 42, 1869.

—— A membranous band beneath vocal cords. SCHRÖTTER, *Wien. Med. Woch.*, April 3, 1869, p. 449.

—— Laryngeal poylp found after death in a case of diphtheritic croup for which tracheotomy had been performed. BERGERON, *Gaz. hebd.*, 1869, p. 253.

—— A. contribution to the Surgical therapeutics of the air-passages. Cases. Removal of a morbid growth from the cavity of the larynx by laryngo-tracheotomy, subsequent escape of a hard rubber trachea tube into the right bronchus, and its removal by operation. BUCK, *Trans. N. Y. Acad. Med.*, vol. iii., part x., New York, 1870.

—— Contributions to practical laryngoscopy. Four cases of morbid growths within the larynx. RUPPANER, *N. Y. Med. Jour.*, January, 1870, p. 337. Cuts.

—— Polype du larynx. Extraction par les voies naturelles. Guérison. Patient 14¼ years. KRISHABER, *Gaz. des hôp.*, 1870, p. 147.

—— of animals. MACKENZIE, *Med. Times & Gaz.*, March 11, 1871, p. 293.

—— Laryngologische Beiträge. E. NAVRATIL, Leipzig, 1871.

—— Essays on Growths in the larynx. MORELL, MACKENZIE, London, 1871.

—— Thyrotomy for the removal of laryngeal growths. E. CUTTER, Boston, 1871.

—— Contributions to Practical Laryngoscopy. A. RUPPANER, second series, N. Y., 1871.

—— Contributions to laryngoscopic Surgery. CARLO LABUS, *Gaz. Lomb.*, 1871, 30.

—— Excision of a papilloma from the right vocal cord. JO. M. OERTEL, *Blätter für Heilwiss.*, 1871, ii., 4. 5.

HOARSENESS.—Nature and treatment of. TROUSSEAU, *Am. Jour. Med. Sci.*, October, 1853, p. 495.

—— Etymology of. *Brit. & For. Med.-Chir. Rev.*, Jan. 1869, p. 279.

HYGROMA.—On a peculiar form of congenital tumor of the neck. HAWKINS, *Med.-Chir. Trans*, 1839, p. 231.

—— Des Kystes du Cou. VOILLEMIER, Paris, 1851.

—— Das angeborene Cysten-Hygrom. des Halses. GÜRLT, über die Cystengeschwülste des Halses. Berlin, 1855.

—— Die Scheimbeutel Hygrome der Regio thyreo-hyoidea. GÜRLT, *Ibid.*

HYGROMA.—Das Hygroma hyo-epiglotticum. *Virch. Arch.*, 1864, 1 & 2, p. 234.

—— Super-laryngeal encysted tumors. HAMILTON, ELSBERG, POOLEY, *The Medical Record*, February 15, 1870.

—— of hyoid bursa. MACKENZIE, case 7 or 8 years' duration. Difficulty of swallowing and breathing. Cyst punctured and seton introduced; produced laryngeal irritation, but cured patient; refers to HAMILTON and ELSBERG, in *Medical Record*, February, 1870. *Med. Times & Gaz.*, February 11, 1871.

HYOID BONE.—Fracture; œdema, tracheotomy, artificial respiration, cure. *Am. Jour. Med. Sci.*, January, 1855, p. 71.

INFLUENZA.—Atmospheric changes during prevalence of influenza in England. HINGESTON (*London Med. Gaz.*, August, 1831), *Am. Jour. Med. Sci.*, vol ix., p. 536. .

—— State of dew-point in connection with epidemic at Philadelphia, in 1831. *Am. Jour. Med. Sci.*, vol. ix., p. 541.

—— As it occurred in Burke Co., Ga., in 1831–2. BALDWIN, *Am. Jour. Med. Sci.*, vol. xi., p. 33.

—— On the influenza or epidemic catarrhal fever of 1847–8. PEACOCK, London, 1848.

—— Annals of Influenza. THOMPSON, *Sydenham So.*, London, 1862.

—— Remarks on the epidemic influenza of 1861 and of 1863, etc. LEVICK, *Am. Jour. Med. Sci.*, January, 1864, p. 65.

—— Sydenham So. Bienn. Retrosp., 1867–8, p. 66.

—— Clinical lecture on. JONES, *Brit. Med. Jour.*, July 23, 1870, *The Medical Record*, v., p. 374.

INHALATION.—On inhalation. BEIGEL, 1866.

—— Apparate für. F. FIEBER, Wien, 1865, 1866.

—— Die Behandlung, etc., Hals und Lungenleiden durch Einathmungen. SIEGLE, Stuttgart, 1864.

—— Die Inhalations-Therapie. LEWIN, Berlin, 1865.

—— Behandlung des Croup und der Diphtheritis mittelst Zinnober Inhalationen. *Wien. Med. Woch.*, 1869, 1. p. 10.

INSUFFLATION.—Of nitrate of silver in laryngitis. EBERT, *Am. Jour. Med. Sci.*, Oct. 1855, p. 515.

—— Instrument for, combined with tongue-depressor, illustrated. GELLE, *Gaz. hebd.*, 1869, No. 10. p. 153.

—— do. do. MILLOT (cut), *Gaz. Méd.*, Paris, 1867, p. 722.

LARYNX, LARYNGOSCOPY, ETC.—On the larynx and trachea. PORTER, London, 1837.

—— On the larynx and trachea. RYLAND, London. 1837.

—— Case of laryngitis, with œdema of lungs as well as of larynx. ANNAN, *Am. Jour. Med. Sci.*, July, 1841, p. 103.

—— Laryngeal gymnastics in ulceration of larynx. TROUSSEAU, *Am. Jour. Med. Sci.*, July, 1854, p. 229.

—— Aphonia, dyspnœa, etc., in laryngitis, ordered to swallow snow; voice regained in a few hours, etc. PARKS, *Am. Jour. Med. Sci.*, April, 1854, p. 360.

LARYNX, LARYNGOSCOPY, ETC.—Labor during progress of laryngitis; laryngo-tracheotomy; recovery; voice weak. LINDERMANN, *Am. Jour. Med. Sci.*, Oct., 1856, p. 389.

—— Der Kehlkopfspiegel und die Methode seines Gebrauches. TÜRCK, Wien, 1856.

—— Der Kehlkopfspiegel und seine Verwerthung, für Physiologie und Medizin. CZERMAK, Leipsig, 1860.

—— Du laryngoscope au point de vue prat. FAUVEL, Paris, 1861.

—— Die Kehlkopfkrankheiten. RUHLE, Berlin, 1861.

—— Sore-throat and the laryngoscope. JAMES, London, 1861.

—— Clinical researches on different diseases of the larynx, trachea, and pharynx examined by the laryngoscope. TÜRCK, London, 1862.

—— Étude prat. sur le laryngoscope et sur l'application des remèdes topiques, etc. FOURNIÉ, Paris, 1863.

—— Klinik d. Krankheiten d. Kehlkopfes u. d. angrenzenden Organe. LEWIN, Berlin, 1863.

—— Die Pharyngoskopie und Rhinoskopie, etc. VOLTOLINI, *Deutsche Klinik* 10, 1863.

—— Die Laryngoskopie u. ihre Verwerthung f. d. arztl. Praxis. SEMELEDER, Wien, 1863.

—— Laryngoscopal medication. ELSBERG, N. Y., 1864.

—— Die Krankheiten des Kehlkopfes. BAUMGARTNER, Freiburg, 1864.

—— Essai sur la laryngoscopie et de la rhinoscopie. GUILLAUME, Paris, 1864.

—— Traité pratique de laryngoscopie et de rhinoscopie. MOURA, Paris, 1865.

—— Die Laryngoskopie, etc. VON BRUNS, Tübingen, 1866.

—— MERKEL'S review (an excellent article), *Schmidt's Jahrb.* cxxxiii. p. 337, cxxxiv. p. 99, cxxxvii. p. 225.

—— Apparat zur laryngoskopischer Demonstrationen. BESE, *Deutsche Klinik*, 1866. 15.

—— Rhinoscopy and laryngoscopy. SEMELEDER, translated by Caswell, New York, 1866.

—— The Laryngoscope, etc. JOHNSON, London, 1867.

—— Speculum for; ROBERT et COLLIN, *Gaz. hebd.*, 1867, p. 121; *Gaz. Méd. Paris*, 1867, p. 127.

—— Ether in exudative laryngitis. LIVINGSTON, *Am. Jour. Med. Sci.*, April, 1867, p. 376.

—— Case of laryngitis produced by administration of Calomel. LOCKING, *Lancet*, Oct. 24, 1868.

—— Chronic diseases of larynx. TOBOLD, translated by Beard, New York, 1868.

—— Laryngoscopy and rhinoscopy. RUPPANER, New York, 1868.

—— Fall von Laryngitis mit Nekrose, nach Typhoidfieber. BROEN, *Press. Méd.* xxi. 21.

—— Tubercular affections of larynx. PRINZ, *Arch. der Heilkunde*, 1868, No. 5.

—— Einige Bemerkungen zur Laryngoskopie und laryngoskopischen Chirurgie. WALDENBURG, *Berlin Klin. Woch.*, 1868, No. 51.

—— OLIVER'S laryngoscope, *Boston Med. & Surg. Jour.*, Oct. 8, 1868.

LARYNX, LARYNGOSCOPY, ETC.—DE CRISTOFORIS' laryngoscope, *Annali Uni di Med.*, Oct., 1868.

—— De l'emploi du spéculum laryngien dans le traitement de l'asphyxie par submersion, etc. LABOYDETTE, Paris, 1868; reviewed favorably in *Brit. and For. Med. Chir. Rev.*, Jan. 1869, p. 157.

—— FAUVEL'S laryngoscope, for bedside use, *Bul. Gén. Thér.*, May, 1869, p. 479.

—— Lehrbuch der Laryngoskopie. TOBOLD, 2d ed., Berlin, 1869.

—— Clinical notes on diseases of the larynx. MARCET, London, 1869.

—— Instruments. New small forceps hook with thread holder for steadying laryngeal polyps during operation; also, a new instrument for securing small portions for microscopic examination. SCHRÖTTER, *Wien. Med. Woch.*, 1869, No. 67, p. 1126.

—— Snare-like blade of tonsillotome. Laryngoskopische Operationen. STOERK; cuts, *Wien. Med. Woch.*, Sept. 29, 1869, p. 1297.

—— Ueber laryngoskopische Operationen. STOERK, *Wien. Med. Woch.*, xix. 78, 79, 80, 91, 92, 1869.

—— Illuminating apparatus. MALACHIA DE CHRISTOFORIS, *Ann. Univers.* xxii. p. 209.

—— Extensive illuminating apparatus, oxy-hydrogen light, etc., in London Hospital for Diseases of the throat; patent chair, etc., illustrated, *Med. Times & Gaz.*, July 24, 1869, p. 98.

—— Bemerkungen zur Laryngoskopie und laryngoskopische Chirurgie, *Berlin. Klin. Woch.*, v. 51, 1869.

—— Appareil pharyngo-laryngoscopique. FAUVEL'S mirror, light, and tongue-depressor combined in one apparatus; illustrated. *Le Mouvement Méd.*, 1869, No. 20, p. 240.

—— Differential diagnosis of syphilis, phthisis, and cancer of larynx. MACKENZIE, *Med. Times & Gaz.*, 1869, p. 505.

—— Larynx in the negro, *Gaz. hebd.*, 1869, No. 25, p. 386.

—— Affections of larynx in typhoid fever. TROUSSEAU; CLIN. MED., vol. II., p. 398 et seq.

—— Dangers from hemorrhage into larynx. Ueber d. durch Eindringen von Blut in d. Kehlkopf bedingten Gefahren. VON NUSSBAUM, *Bayer. Aerztl. Int. Bl.*, 1869, 5.

——Larynx in progressive locomotor ataxy. Quelques symptômes visceraux, et en particulier sur les symptômes laryngo-bronchiques de l'ataxie locomotive progressive. FÉREOL, *Gaz. hebd.*, 1869, p. 108.

—— Laryngitis in typhoid fever. DE BROEN, *Presse Méd.*, 1869, xxi. 21.

—— Unusual appearances of larynx in two cases of typhoid fever, *Am. Jour. Med. Sci.*, April, 1855, p. 347.

—— Perichondritis laryngeal following typhoid fever. GILLIARD, *Presse Méd.*, 1869, xxi. 20.

—— Larynx and trachea in tabes dorsalis. FÉREOL, three cases of his own, one of Cruveilhier, 1825, and one of Bourdon, 1862. *L'Union*, 1869, 4, 5, *Schmidt's Jahrb.*, 1869, Bd. 143, 8, p. 161.

LARYNX, LARYNGOSCOPY, ETC.—Removal of in dogs. Successful experiments of CZERNY, of Vienna, *Brit. Med. Jour.*, June 18, 1870, p. 637.

—— Laryngo-typhus. Tracheotomy. Recovery. ULRICH, *Berlin. Klin. Woch.*, 1868, No. 45, *Arch. Gén.*, 1870, Sept., p. 366.

—— (instrument). Die Lanzennadelspritze zur Punction und Transfusion, beim Scheintod und in der Laryngoskopie. BRESGEN, Köln u. Leipzig, 1870.

—— Laryngo-tracheitis. Cold-water treatment. Die Behandlung der chronischen Laryngo-Tracheitis. CORDES, *Berlin. Klin. Woch.*, Jan. 1870, 2, *Wien. Med. Woch.*, March 12, 1870, No. 18, p. 286.

—— Sui Restringimenti Laryngei. MASSEI, Naples, 1871.

—— Local treatment. Ueber die Wahl der Medikamente bei der Lokaltherapie des Larynx und der Trachea (*Wien. Med. Woch.*, xx. 58, 59), *Schmidt's Bibl.*, April, 1871.

—— The use of the laryngoscope. MACKENZIE, 3d ed., London, 1871.

LARYNGOTOMY & TRACHEOTOMY.—In tonsillitis. Extemporaneous substitution of quills for canule. *Am. Jour. Med. Sci.*, vol. ii. p. 213.

—— for occlusion of larynx, case subsequent to attempt at suicide. (*Edinb. Med. Jour.*, Jan. 1828.) *Am. Jour. Med. Sci.*, ii. p. 214.

—— Causes of fatal termination in certain cases of bronchotomy. CULLEN (*Edinb. Med. & Surg. Jour.*, Jan. 1828). *Am. Jour. Med. Sci.*, vol. ii. p. 462.

—— Cases of Tracheotomy (Canula worn 12 years). *Am. Jour. Med. Sci.*, iii. p. 471.

—— in an epileptic. NEILL, *Am. Jour. Med. Sci.*, Jan. 1853, p. 274.

—— in epilepsy. RADCLIFFE, *Am. Jour. Med. Sci.*, July, 1853, p. 217.

—— Trach. in Laryngismus. HALL, *Am. Jour. Med. Sci.*, July, 1853, p. 55.

—— T., for œdema glottidis consequent on fracture of hyoid bone. WILLIAMS, *Am. Jour. Med. Sci.*, Jan. 1855, p. 71.

—— T., in croup. Statistics of CHAILLOU, 390 cases, 86 cures. *Am. Jour. Med. Sci.*, July, 1858, p. 251.

—— T. BRAINERD'S method. *Am. Jour. Med. Sci.*, July, 1857, p. 291.

—— Results in 1249 cases of croup; the recoveries numbering 294. VOSS, *N. Y. Jour. Med.*, Jan. 1860.

—— T. for croup, 33 cases. BŒCKEL, *Gaz. Med. Strasb.*, 1867, p. 295.

—— Tracheotomy in cynanche trachealis, diphtheria, and laryngitis. HAUGHTON, *Trans. Indiana State Med. Soc.*, 1867, p. 122.

—— BOURDILLAT on tracheotomy. *Gaz. hebd.*, 1867, p. 540. Discussion on tracheotomy, 461 (at 6 mos.), 508, 540.

—— New Canules. BROCA'S, *Gaz. hebd.*, 1867, p. 235.

—— Impossibility of removing tube after 16 mos. PARIS, *Am. Jour. Med. Sci.*, Jan. 1868, p. 273.

—— T. in croup. JACOBI on, 67 operations. *Am. Jour. Obstet.*, May, 1868.

—— New canule of BOURDILLAT, *Gaz. hebd.*, 1868, p. 154.

—— T. for croup consecutive to ulcero-membranous stomatitis, in an infant of 22 mos.; cure. ISAMBERT, *Gaz. hebd.*, 1868, pp. 330, 348.

LARYNGOTOMY AND TRACHEOTOMY.—With prolonged use of canula. EHRMANN, *Gaz. Med. Strasb.*, 1868, p. 177.

—— Statistics in French hospitals for 1862. *Gaz. Méd. Paris*, 1868, p. 375.

—— BARTHEZ on results (concerning above cases). *Gaz. Méd. Paris*, 1868, p. 448.

—— VACHER'S response to Barthez (strictures on above). *Gaz. Méd. Paris*, p. 466.

—— BARTHEZ replies, *Gaz. Méd. Paris*, p. 528.

—— T. in croup; diphtheria of wound; cure. *Memorabilien*, 1868, p. 21.

—— Statistics. AITKEN'S Practice, Am. Edit., 1868.

—— Laryngo-trach. in suffocation from drinking boiling water; cure. *Lancet*, Aug. 22, 1868.

—— Some valuable remarks regarding time of operation, tube, etc. MARCET & HILMAN, *Lancet*, Dec. 12, 1868.

—— Faits cliniques de laryngotomie. PLANCHON, Paris, 1869.

—— On some of the difficulties and dangers of tracheotomy, and the best means of obviating them; with a description of a new form of tracheal canula. DURHAM, *Practitioner*, April, 1869, p. 212.

—— Cases of diphtheria saved by tracheotomy, and remarks on the operation; 31 cases operated on, 11 saved; 9 not operated on, all perished. BUCHANAN, *St. Andrew's Trans.*, 1868, *Am. Jour. Med. Sci.*, April, 1869, p. 483.

—— See notice in *Wien. Med. Woch.*, March 17, 1869, p. 372 of PINGLER'S Der einfache und diphtheritic Croup, etc. 17 years' observations.

—— On the management of the tube when tracheotomy is followed by great swelling of the neck, with a simple device for introducing it readily. COUPER, *London Hosp. Rep.*, *Brit. & For. Med. Chir. Rev.*, July, 1869, p. 41. A flexible rod of gutta percha tapering to a point is inserted, and the tube run down on it.

—— BILLROTH on the difficulties of tracheotomy in children, etc.; statistics of his own cases and other references. *Wien. Med. Woch.*, April 3, 1869, p. 454.

—— Réflexions sur l'opération de la trachéotomie dans les cas de croup, modification à apporter au procédé ordinaire. GUILLON, *Bul. Gén. Thér.*, 1869, p. 267. He proposes a sort of eyelet of flexible ivory, or of lead, to prevent the irritation, etc., produced by the canule.

—— Zur Casuistik der Laryngotomie. HOFMOKL, *Wien. Med. Presse*, 1871, xii. 3–6.

—— Thyrotomy for the removal of laryngeal growths. CUTTER, Boston, 1871.

MUCUS.—On the movement of mucus in the larynx and trachea. VEALE, *Lancet*, July 22, 1871, p. 121—left to right—diagram.

MUMPS.—In a pregnant woman in premature labor, followed by appearance of same disease in the infant 24 hours after birth. *Am. Jour. Med. Sci.*, Jan. 1855, p. 56.

NASAL PASSAGES, ETC.—Case of larvæ hatched in; also elsewhere. CLOQUET, *Am. Jour. Med. Sci.*, vol. ii. p. 228.

Nasal Passages, etc.—Metastasis to, curing gastro-meningeal irritation. Jackson, *Am. Jour. Med. Sci.*, vol. ii. p. 229.

—— Complete amaurosis cured by application of leeches to. *Am. Jour. Med. Sci.*, vol. iv. p. 231.

—— Periodical hemicrania terminating by the evacuation of a calculus through the nose. Axmann, *Am. Jour. Med. Sci.*, vol. v. p. 204.

—— Disease of maxillary sinus from blow on nose, etc. Couper, *Am. Jour. Med. Sci.*, vol. vi. p. 519.

—— Fibrous tumor in the neurilemma of fifth pair, mistaken for polyp and operated on. Greco, *Am. Jour. Med. Sci.*, vol. vii. p. 227.

—— Tumeurs osseuses sans connexions avec les os. Follin, *Bull. de la Société de biologie*, 1850–1.

—— Exostose éburnée de l'os ethmoide occupant toute la masse latérale droite de cet os. Maisonneuve, *Gaz. des hôp.*, 1853, No. 95.

—— Destructive disease of nose, larynx, and trachea; with specimens, cast of face, etc. Jackson, *Am. Jour. Med. Sci.*, Jan. 1853, p. 99.

—— Sarcina ventriculi in connection with disease of. Durkee, *Am. Jour. Med. Sci.*, Jan. 1854, p. 96.

—— Gonorrhœa of, from use of handkerchief. Edwards, *Am. Jour. Med. Sci.*, Oct. 1857, p. 531.

—— Exostosis of left, and l. orbital foramen. Mott, *Am. Jour. Med. Sci.*, Jan. 1857, p. 36.

—— Foreign body retained upwards of twenty years. Hays, *Am. Jour. Med. Sci.*, April, 1858, p. 390.

—— Treatment of diseases of, by mercurial cigarettes. *Am. Jour. Med. Sci.*, April, 1859, p. 541.

—— Obstinate chronic discharge from, relieved by extraction of a carious tooth. Fleischmann, *Brit. Med. Jour.*, April 9, 1859.

—— Development of larvæ of dipteræ in the frontal sinuses and nasal fossæ of man, at Cayenne. Coquerel (*Brit. & For. Med. Chir. Rev.*, Oct. 1858, from *Arch. Gén.*, May, 1858), *Am. Jour. Med. Sci.*, Jan. 1859, p. 254.

—— Mémoire sur les exostoses du sinus frontal. Dolbeau, *Bull. de l'Acad. de Méd.*, 1866.

—— Fracture of cartilage of septum. Jarjavay, *Gaz. hebd.*, 1867, p. 476.

—— Removal of steel ring lodged in for 3½ years, and discovered by the rhinoscope. Hickman, *Brit. Med. Jour.*, 1867.

—— Ring introduced into nostril and forgotten for 13 years. *Brit. Med. Jour.*, 1867.

—— Insects in, thence to frontal sinus, sometimes necessitating trepanning for removal. *Gaz. hebd.*, 1867, p. 814.

—— Administration of medicaments by. Rambert. *Union Méd. Gironde*, Nov. 1867, p. 543. *Gaz. hebd.*, 1867, p. 426.

—— Fracture of nasal bones. Emphysema of eyelids of left eye, caused by an old fracture of nasal bones. *Gaz. des hôp.*, 1868, p. 58.; *Edinb. Med. Jour.*, Oct., 1869; *Ranking's Abst.*, 1869, xlviii., p. 140.

—— The nose. Its rôle in questions of hygiene. *Union Méd. Gironde*, 1868, p. 627.

NASAL PASSAGES, ETC.—On the nose. URE. *Holmes' Surgery*, vol. iii.

—— Disease of nasal bones sometimes gives rise to cerebral abscess. JACKSON, *London Hosp. Rep.*, vol. iv., 1867–8.

—— Necrosis of cartilages of nose, in typhoid fever. TROUSSEAU, *Clin. Med.*, vol. ii.

—— Concretions in nasal passages. *Edinb. Med. Jour.*, v., p. 501; *Allg. Med. Cent.-Ztg.*, 1868, No. 88, p. 733.

—— Speculum nasi for. DUPLAY, *Mouve. Méd.*, 1868, p. 336; *Gaz. hebd.*, 1868. p. 792.

—— Straightening septum of nose. Instrument zur Heilung der verkrümmten Nasenscheidewand. RUPPRECHT, *Wien. Med. Woch.*, 1868, xviii., 72.

—— Nasal septum. Perforation of, in manufacture of bichromate of potassa. BERNARD, HILLAIRET, LAILLER, GUBLER. *Comment. Thérap.*, GUBLER, Paris, 1868, p. 405.

—— Administration of food and medicine by the nose. MOXLEY, *Practitioner*, April, 1869, p. 240; *Lancet*, March 20.

—— Sur les résections sous-périostées de la cloison nasale. CHASSAIGNAC, *Gaz. hebd.*, 1869, No. 24, p. 380.

—— Instrument for examining. Ueber ein Verfahren zum Zwecke des Besichtigung des vorderen und mittleren Drittheiles der Nasenhöhle. WERTHEIM, *Wien. Med. Woch.*, 1869, Nos. 18, 19, 20, illustrated. A sort of Choanoscope; a diagonal mirror in a tube.

—— Syphilitic affections of nose and adjacent parts, hereditary, but not showing themselves until the age of 10, 16, etc. LANCEREAUX on Syphilis, vol. ii., p. 165.

—— Des Ostéomes de l'organ de l'olfaction. GAUBERT, Paris, 1869.

—— Sur les tumeurs osseuses des fosses nasales et des sinus de la face. OLIVIER, Paris, 1869.

—— Nares. Occlusion of posterior nares. Syphilitic adherence of palate (save uvula) to pharynx. SILVER, *Med. Times and Gaz.*, 1870, p. 619.

—— Foreign body in. A sailor, æt. 29, received portion of a bursted gun-barrel in frontal sinus, Jan. 5, 1864. Jan. 10, 1870, a breech and screw was removed weighing 3 oz. 6 gr. Subsequently a rhinoplastic operation was performed. BARTLETT, *Brit. Med. Jour.*, 1870, p. 704.

NASAL POLYPS.—Cure by saffronized tr. opii. PRIMUS, *Am. Jour. Med. Sci.*, ii., p. 218.

—— Case of gelatinous polypus cured with Sanguinaria Canadensis, after extraction had twice failed. SHANKS, *Am. Jour. Med. Sci.*, Oct., 1842, p. 368.

—— and affections confounded with them. Cure by insufflation of tannin. BRYANT, *Lancet*, 1867, Feb. 23, Aug. 24.

—— removed by tr. ferri chloridi. MAXWELL, *The Medical Record*, vol. iii., p. 353.

—— Cure by injection of ferri persulph. GARDNER, *The Med. Record*, 1869, Feb. 1, p. 540.

Nasal Polyps.—Removal of a large nasal polyp. Smith, *Med. Times and Gaz.*, Oct. 2; *Brit. Med. Jour.*, Nov. 20, p. 557.

—— Polype glandulaire de la muqueuse nasale. Repullulation. Extirpation et cauterization. Accidents consécutifs à l'opération. Paralysie de tous les muscles de l'œil. Symptômes d'empoisonnement par la morphine. Mort. Autopsie. Boyron, *Le Mouvement Médical*, 1869, xix., p. 221.

—— Fibrinous polypi from the nares. Squire, *Trans. Path. So., London*, xxi., 1870, p. 343.

—— removed from child 9 years old. Marsh, *Trans. Path. So., London*, xxi. p. 343.

Naso-pharyngeal Polyps.—Polype fibreux de la base du crâne. Nélaton, *Gaz. des hôp.*, 1853, No. 5.

—— Polypes naso-pharyngiens. Michaux, *Gaz. des hôp.*, 1853, No. 13.

—— Extraction sub-periosteal, by anterior opening of sup. max. Executed behind the everted upper lip. Larghi, *Gaz. Méd. Paris*, 1867, p. 617.

—— Michaux, *Gaz. hebd.*, 1867, p. 361.

—— Diagnosis and treatment of naso-pharyngeal polyps. Herrgott, *Gaz. des hôp.*, 1867, 25.

—— Treatment of naso-pharyngeal polyps by electricity. Nélaton and Hiffelsheim, *Union Méd. Gironde*, 1868, pp. 225, 228.

—— Return of, in case operated on by a new method in Nov., 1865. Legouest, *Gaz. hebd.*, 1868, p. 685.

—— Rapport sur une observation de polype naso-pharyngien à embranchements multiples. Thomas, *Gaz. hebd.*, 1869, 1, p. 13.

—— Removed by a new operation. Cure. Bonnes, *Bull. de Thérap.*, lxxvii., Oct. 30, p. 364.

—— Extirpation after resection of upper jaw. Thomas, *Gaz. des hôp.*, 1869, No. 3.

—— Nouvelle note sur le diagnostic et le traitement des polypes fibreux naso-pharyngiens. Michaux, Rugination, etc., *Bull. de l'Acad. Méd. roy. Belg.*, 1867, No. 6, p. 510.

—— Case operated on by a new method. Cure. Bonnes, *Bull. Gén. Thér.*, 1869, p. 364. Consists in ablation by means of a metallic nail attached to a thimble.

—— Operations on nasal and naso-pharyngeal polyps. Voltolini, *Berlin. Klin. Woch.*, vi. 40.

—— Polype naso-pharyngien à embranchements multiples, et à développement rapide. Ablation du maxillaire supérieur. Arrachement du polype. Hémorrhagie considérable, syncope. Introduction du sang dans les voies aériennes. Mort immédiate. Verneuil, *Gaz. des hôp.*, Aug. 9, 1870, p. 366. Presentation of specimen and remarks, *ibid.*, Aug. 16, 18, p. 379. Continuance of discussion, *ibid.*, Aug. 23, p. 387.

—— Naso-pharyngeal polyp connected with membranes of brain. Operation. Autopsy. Remarks at Clin. Soc., London. Forster, *Med. Times & Gaz.*, May 27, 1871, p. 617.

—— Removed by turning down the nose. Tracheotomy. Recovery. Cabot, *Boston Med. & Surg. Jour.*, 1871, p. 95.

NERVOUS affections of larynx, etc. Hoarseness. Loss of voice, and stridulous breathing. Mackenzie, 2d ed., London, 1868.

—— Der hysterische Krampfhusten. Theodor, Greifswald, 1868.

NITRIC ACID.—On the treatment of chronic cases of sore-throat by the local application of strong nitric acid. Mackintosh, *Med. Times & Gaz.*, 1869, p. 188.

ŒDEMA.—Traité pratique de l'angine laryngée œdémateuse, Paris, 1837.

—— La bronchotomie dans le cas d'angine laryngée œdémateuse. Sestier, *Arch. Gén.*, 1850.

—— Traité de l'angine laryngée œdémateuse. F. Sestier, Paris, 1852.

—— Œdema glottidis resulting from typhus fever. Emmet, Phila., 1856.

—— Pitha, *Brit. & For. Med. Chir. Rev.*, Oct., 1857.

—— Ferréol, *Bull. de la So. Anat.*, 1857–8.

—— Deux cas d'œdème de la glotte guéris par le traitement médical seul. Alling, *Union Méd.*, 1869, No. 97.

—— From use of pot. iod. Nélaton, *Abeille Méd.*, x. 317.

—— From use of pot. iod.; fatal. Laurie, *Stillé's Therapeutics*, II. p. 763.

—— Sequel of typhoid fever. Trousseau, *Clin. Med.*, Vol. II.; 10 cases, all fatal, tracheotomy in 5.

—— In croup without known cause. Death before operation could be made, *Gaz. hebd.*, 1869, p. 25.

—— In whooping-cough. Barthez, *Gaz. des hôp.*, 1869, 32.

—— *Med. Record*, Vol. III., p. 449.

—— Subglottic œdema and permanent stricture of larynx following typhus. Russel, *Glasgow Med. Jour.*, Feb., 1871, p. 209.

OZÆNA.—Chloride of lime in. Horner, *Am. Jour. Med. Sci.*, vol. vi., p. 265.

—— Chloride of lime in. Awl, *Am. Jour. Med. Sci.*, vol. xi., p. 543.

—— Glycerine in. Mayer, *Am. Jour. Med. Sci.*, April, 1858, p. 338.

—— Iodine and glycerine in, *Am. Jour. Med. Sci.*, April, 1859, p. 578.

—— Treatment of. Heath (*Lancet*, 1867), *Gaz. Méd. Paris*, 1868, p. 362.

—— Treatment of. Cousin, *Bull. de Thérap.*, 1869, p. 494.

—— Ulcerative syphilitic. Lanceraux on Syphilis, vol. ii., p. 102.

—— Traitement de l'ozène, *La France Méd.*, 1869, No. 4. p. 30.

ŒSOPHAGUS, ETC.—Bones, etc., arrested in alimentary canal, and making their way elsewhere. Bell (*London Med. Gaz.*, vol. i., No. 7), *Am. Jour. Med. Sci.*, vol. ii., p. 472.

—— For. body in œsophagus. Case in which the heart of a fowl was arrested in the O., remained there fifteen days, and then proved fatal. Autopsy. Denton, *Am. Jour. Med. Sci.*, vol. v., p. 544.

—— Dysphagia from scrofulous degeneration of œsophagus, cured. Bennett, *Am. Jour. Med. Sci.*, July, 1841, p. 243.

—— Inability to swallow, in an infant. Pierce, *Am. Jour. Med. Sci.*, July, 1853, p. 273.

—— Beobachtung einer Hypertrophie des Œsophagus. Spengler (*Wiener Woch.*, No. 25), *Canstatt's Jahresbericht*, 1853, 3, p. 278.

—— Pin swallowed, discharged per rectum; 2 cases, *Am. Jour. Med. Sci.*, Jan., 1855, p. 58.

ŒSOPHAGUS, ETC.—Fourpence swallowed, removed from rectum, *Am. Jour. Med. Sci.*, Jan., 1855, p. 248.

—— Cancerous disease of pharynx and O.; laryngeal symptoms; larynx healthy. WARE, *Am. Jour. Med. Sci.*, April, 1855, p. 354.

—— Congenital fissure of (?). DUNCAN, *Am. Jour. Med. Sci.*, April, 1856, p. 517.

—— The ready method in cases of choking. HALL, *Am. Jour. Med. Sci.*, April, 1857, p. 500.

—— Spasmodic closure of, terminating fatally. MCKIBBIN (*Trans. Med. So. Pa.*, 1858), *Am. Jour. Med. Sci.*, Oct., 1859, p. 483.

—— Hemorrhage from pharynx, from partial swallowing of a piece of cartilage. PACKARD, *Am. Jour. Med. Sci.*, April, 1859, p. 377.

—— Malignant ulceration of, perforating trachea. CROWTHER, *Med. Press and Circ.*, 1866.

—— Congenital occlusion. PARSONS, *The Med. Record*, 1866, p. 294.

—— Sojourn of a plate (for art. teeth) in pharynx, 5 mos. GEOGHEGAN, *Med. Press and Circ.*, 1866.

—— Removal of penny from infant's pharynx by laryngoscope. JOHNSON, *Brit. Med. Journ.*, 1867.

—— A fork swallowed and extracted from an abscess of the abdominal wall. *Arch. Italiana per la Maladie Nervose*, June 14, 1867. *Gaz. hebd.*, 1867, p. 667.

—— A somewhat similar case reported in *Gaz. hebd.*, 1866, p. 797.

—— Acute delirium from ascaries lumbricoides in œsophagus. LAURENT. *Ann. Méd. Psych.*, Sept., 1867.

—— Spasm of, cured by strychnine. MATHIEU (*Abeille Méd.*, ix., 286), STILLÉ'S *Therapeutics*, ii., p. 159.

—— Spasm of, treated by painting pharynx with tr. iod. ANCELON (*Bul. de thér.*, iv., 92), *Stillé's Therap.*, ii., p. 781.

—— Compression of œsophagus by mediastinal carcinoma. Death in consequence. HELBER, *Memorabilien*, Dec. 12, 1868, p. 192.

—— Rupture of an aortic aneurism into. LOOMIS, *Medical Record*, vol. iii., p. 235.

—— For. bod. and mode of extraction. SAYRE. *Med. Rec.*, vol. iii., p. 271.

—— Tuberculosis of œsophagus. Cases. CHVOSTEK (*Oester. Ztschr. f. prakt. Heilk.*, xiv., 27 and 28, 1868). PAULICKI (*Virchow's Arch.*, xliv., 2 and 3, p. 373, 1868). *Schmidt's Jahrb*, 1869, 141, 3, p. 293.

—— Removal of copper penny in a child æt. 20 months. JOHNSON (*Schmidt's Jahrb.*, 1868, 138, 5, p. 233.)

—— Myome of. EBERTH, muscular fibres 9 cent. long, 11 broad, 3—5 thick. *Virchow's Arch.*, April, 1868; *Gaz. hebd.*, 1868, p. 477.

—— Fusiform dilatation of. VON LUSCHKA, *Virch. Arch.*, April, 1868, xlii., p. 473.

—— Auscultation of. Clinical uses of his method, etc. HAMBURGER, *Wien. Med. Jahrb.*, 1868, xvi., 123; *Medic. Jahrb.*, xv. Bd., ii. H. 1868; Rev. in *Gaz. hebd.*, 1868, p. 793; *La France Méd.*, 1868, p. 748; *Dub. Qr. Med. Jour.*, May, 1869, p. 423.

ŒSOPHAGUS, ETC.—Cancer of, with external openings; and involving the larynx. HEATH (*Trans. Clin. So.*, London, 1868), *Am. Jour. Med. Sci.*, Oct., 1869, p. 477.

—— Perforation. Drei Fälle Erweichung und Durchbruch der Speiseröhre und des Magens. HOFFMANN (*Virchow's Archiv.*, xliv., 2 and 3, 1868, p. 352, and xlvi., 1, 1869, p. 124).

—— Case of traumatic stricture, with remarks. Autopsy. MACKEY, *Med. Times and Gaz.*, Jan. 23, 1869, p. 87.

—— Congenital malformation. ANNANDALE, *Edinb. Med. Jour.*, Jan., 1869, p. 598. Similar cases reported by Sedillot, Andral, Martin, Levy, Meckel, Röderer.

—— Diseases of, in children. STEFFEN, *Jahrb. f. Kinderkr.*, 1869, ii., 2, p. 143.

—— Linked forceps for extraction of for. bod. Cut, in *Gaz. hebd.*, 1869, No. 10, p. 154. MATHIEU.

—— Forceps modelled after Cusco's. Cut, in *Gaz. hebd.*, 1869, No. 14, p. 218.

—— Extraction of a fragment of bone, etc. KRISHABER, *Gaz. hebd.*, 1869, p. 180.

—— A large artificial tooth plate, with projecting angles and several teeth in place, swallowed during sleep, safely voided per anum. *Brit. and For. Med.-Chir. Rev.*, Oct., 1869, p. 373.

—— Ingenious extraction of fish-hook from. JONASSON. A large gum catheter cut square, passed through a sponge and firmly fastened, so that ¾ in. of sponge was free and projected ⅛ in. beyond the end of the catheter. This was run down the fishing-line, etc. (*Australian Med. Jour.*, July, 1869), *Practitioner*, Nov., 1869.

—— Ulceration and perforation of aorta from retention of a coin. *N. Y. Med. Jour.*, Dec., 1869, p. 335.

—— For. bod. Extraction of artificial tooth. DEARDEN, *Brit. Med. Jour.*, Oct. 23, 1869.

—— Extraction de quatre fausses dents, etc. TILLAUX, *Bul. Gén. de Thér.*, Oct. 30, 1869, p. 376.

—— Living fish in O. 16 hours. STEWART, *Lancet*, Sept., 1869, ii., 13.

—— Extraction of teaspoon from. TODD, *Brit. Med. Jour.*, Nov. 13, 1869.

—— Stricture from swallowing caustic potash. Gastrotomy proposed, not performed. Cured by dilatation with bougies. HUTCHINSON (*London Hosp. Rep.*), *Brit. and For. Med.-Chir. Rev.*, July, 1869, p. 28.

—— Paralysis of, during pregnancy. Notable improvement from electro-puncture. Return in second pregnancy. Service of DEMARQUAY. In connection with this case, Duchenne recommended not to pass the induced current by the œsophageal electrode, for fear of exciting the pneumogastric nerve, the nerve of arrest to the heart, and the exciting of which might bring on syncope. *Bul. Gén. de Thérap.*, July 30, 1869, p. 82.

—— Dilatation of. Dilatation anormale de l'œsophage entre les lobes pulmonaires depuis la base du cœur jusqu'au cardia. RAYMOND, *Gaz. Méd., Paris*, 1869, 7, p. 91.

Œsophagus, etc.—Stricture of œsophagus at cardiac end, in a patient aged 43. Rawden, *Liverpool Med. & Surg. Rep.*, 1869, p. 117.

—— Two cases of stricture. Mackenzie, *Med. Times and Gaz.*, July 16, 1870.

—— Removal of foreign body, by hooking a pin and passing a probang on top. Trayer, *Med. Times and Gaz.*, April 30, 1870, p. 465.

—— Case of a nail safely passing through the alimentary canal of a baby. Blower, *Brit. Med. Jour.*, 1870, p. 204.

—— Artificial plate removed from stomach with œsophageal coin-catcher. Little, *Am. Jour. Med. Sci.*, April, 1870, p. 558.

—— Caries of spine from swallowing a nail. Direct communication between œsophagus and spine; secondary consolidation of lung; amyloid disease of liver and spleen. Reported by Dr. Steven, *Brit. Med. Jour.*, Dec. 10, 1870, p. 629.

—— Perforation of, by a bougie. Fatal, apparently from acute pneumonia. Found to have penetrated some distance into left lung. No trace of stricture at post-mortem. Green. *Brit. Med. Jour.*, Dec. 17, 1870, p. 650.

—— Stomach tube passed through larynx; fluid pumped into trachea. Green. *Ibid.*

—— Tuberculous stricture of O. Kraus (*Centbl. f. Med. Wiss.*, 1869, No. 50); *Am. Jour. Med. Sci.*, April, 1870, p. 537.

—— True diaphragmatic hernia, with stricture of O. Hill, *Trans. Path. So. London*, xxi. 1870, p. 154.

—— Post-mortem solution of O., and not of stomach. Moxon, *Trans. Path. So. London*, xxi., 1870, p. 159.

—— Stricture from swallowing lye. Ashhurst, *Am. Jour. Med. Sci.*, April, 1871, p. 393.

—— Tumors of œsophagus; malignant, in a female æt. 48, ill 12 mos.; lungs and glottis slightly affected. Do. in a man æt. 51; complained first of dysphagia, latterly of dyspnœa. Left vocal cord paralyzed. Disease opened left carotid. Opening existed between trachea and œsophagus, *Med. Times & Gaz.*, 1871, p. 647.

—— Perforation of œsophagus and vena cava descendens by a foreign body. Cœsher (*Berlin. Klin. Woch.*, Oct. 24, 1870), *N. Y. Med. Jour.*, Sept., 1871, p. 314.

—— Case of rupture of œsophagus. Charles, *Dubl. Jour. L.* (100), p. 311, Nov., 1870, refers to many cases, mostly in inebriates. Quotes Gross's Path. Anat.

—— Ueber œsophagus-Krankheiten, Ektasien, Rupturen u. Perforationen, Paralysen, Ulcerationen, Divertikelbildung, excentrische Hypertrophie. (*Wien. Med. Jahrb.*, xx., *Wien. Zeitschr.*, xxvi. 5 and 6, p. 154), *Schmidt's Jahrb. Bibl.*, April, 1871.

—— For. bod. in œsophagus. Dr. Braidwood, *Liverpool Med. and Surg. Rep.*, 1869, p. 112, presented at session 1868–9, of Liverpool Med. Institution; pathological specimens of: 1.) triangular piece of porcelain swallowed in bread and milk, causing a small lacerated wound in

post. wall, penetrating into post. mediastinum, where an abscess had formed. 2). A handkerchief almost entirely impacted, swallowed during typhoid fever. 3). A fish-hook, swallowed; removed by forceps under chloroform.

ŒSOPHAGUS, ETC.—For. bod. and death from abscess. VAN DE WARKER, *N. Y. Med. Jour.*, April, 1871, p. 453.

—— Klinik der Œsophagus Krankheiten, mit diagnost., Verwerthung d. Auskultation dieses Organs. HAMBURGER W. Erlangen, 1871.

ŒSOPHAGOTOMY, ETC., Gastrotomy for removal of a fork passed in the throat to excite vomiting. CAYROCHE (*Rev. Méd. March*, 1829), *Am. Jour. Med. Sci.*, vol. vi., p. 245.

—— Gastrotomy for removal of a bar of lead swallowed in a juggler's feat. BELL, *Am. Jour. Med. Sci.*, July, 1855, p. 272; *Iowa Med. Jour.*, April and May, 1855.

—— For removal of tooth impacted in pharynx. Successful. COCK, *Guy's Hosp. Rep.*, vol. iv., 1858.

—— For stricture, *Gaz. hebd.*, 1867, p. 61.

—— Two cases, with a history of the operation. CHEEVER, Boston. 2d ed. with another case, 1868.

—— For stricture from epithelial growths. Death. Autopsy. WILLETT, *St. Bartholomew Hosp. Rep.*, vol. iv., 1868, p. 204.

—— For malignant stricture. Patient survived eighteen days. Author recommends opening gullet at a point on a level with the cricoid cartilage. WILLETT, *St. Bartholomew's Hosp. Rep.*, 1868, art. xii., *Am. Jour. Med. Sci.*, Jan., 1869, p. 195.

—— For epithelioma of œsophagus. DURHAM, *Guy's Hosp. Rep.*, xiv., 3d S. *ibid.*, 1869, p. 195.

—— Cases of œsophagotomy. MENZEL, *Wien. Med. Woch.*, 1870, xx. 56.

—— SÉDILLOT, Rev. in *Edinb. Med. Jour.*, Feb., 1869, p. 727.

—— FENGER, COOPER, FOSTER, JONES.

—— Two cases of internal œsophagotomy in stricture following deglutition of sulphuric acid. DOLBEAU; one case of TRÉLAT, from fibrous stricture, reported in *Gaz. des hôp.*, April 5, 1870, p. 158. Trélat's instrument is figured in *Gaz. des hôp.*, March 10, 1870, p. 115.

—— De l'œsophagotomie externe. TERRIER, Paris, 1870.

—— Three cases of œsophagotomy. CHEEVER, *Boston City Hosp. Rep.*, 1870.

—— For stricture of œsophagus. MAURY, *Am. Jour. Med. Sci.*, April, 1870, p. 365.

—— With case. LOWE, *Lancet*, July 22, 1871, p. 119.

PALATE.—Congenital deficiency of, and modes of relief. POLLOCK, *Am. Jour. Med. Sci.*, April, 1856, p. 514.

—— Case of adherence to pharyngeal wall, *Gaz. hebd.*, 1867, p. 222.

—— Growth of, to pharyngeal wall. Cure by dilatation. *Memorabilien*, Nov. 16, 1868, p. 180.

—— Paralysis of, from pot. brom. in 30 grain doses three times a day, for six weeks. HUSBAND, *Edinb. Med. Jour.*, Jan., 1869, p. 656.

Palate.—Fissure of. Beiträge zur Operationen des hervorragenden Zwischenkiefers bei doppelter Lippen- und Gaumenspalte, *Deutsche Klinik*, 1869; No. 2, p. 21; No. 3, p. 30.

—— Abnormal soft palate. Cavins, *Edinb. Med. Jour.*, June, 1869, p. 1135.

—— Position of palate in hanging. Die Stellung des weichen Gaumens beim Tode durch Erhängen. Ecker, *Virch. Arch.*, 1870, 49, 2; *Allg. Med. Cent-Zeitg.*, 1870, No. 10, p. 116.

—— Congenital tumor or excrescence apparently springing from the base of the skull, passing through a cleft in the palate, and protruding from the mouth of a seven-months fœtus still-born. Hill, *Trans. Path. So. London*, xxi., 1870, p. 344.

—— Idiopathic (?) perforating ulcer of the soft palate in a child, healing up without operative interference. Hill, *Med. Times & Gaz.*, 1871; June 3, p. 631.

—— Fibroid tumor of hard palate, which had projected into the mouth, and impeded the motion of the jaws. Tumor had existed six years in a female aged 40. It was supposed to be an exostosis, but came away easily with the gouge. There were no myeloid bodies in the tumor. Adams, *ibid.*

Paralysis—Lähmung der Glottis, des Schlunds und der obern und untern Extremitäten; zweimalige Ausführung der Tracheo-resp. Laryngotomie. *Wurtemb. Corresp. Bl.*, 1867, xxxvii. 10, 11.

—— Glosso-labio-laryngeal. Hérard, *Gaz. hebd.*, 1868, p. 183. *Union Méd.*, 1868, No. 35.

—— Glosso-pharyngo and labial. Mignard, Marchal, *Trib. Méd.*, 1868, p. 314, *Gaz. Méd. Strasbourg*, 1868, p. 9.

—— Glosso-pharyngeal. A case cured. Latour, *Trib. Méd.*, 1868, p. 340.

—— Glosso-pharyngeal. Schützenberger, *Gaz. Méd. Paris*, 1867, p. 726.

—— Labio-glosso-laryngeal. Wilks, *Guy's Hosp. Rep.*, 1870, p. 1.

—— Labio-glosso-laryngeal. Fournier, *Union Méd.*, 1867, 51, 53.

—— Labio-glosso-laryngée. Proust, *Gaz. des hôp.*, 1870, Nos. 51 and 52; calls it "alalie."

—— Recherches icono-photographiques sur la morphologie et sur la structure intime du bulbe humain, leur application à l'étude anatomo-pathologique de la paralysie-glosso-labio-laryngée. Duchenne (of Boulogne), *Arch. Gén.*, May, 1870, p. 539 et seq.

—— Labio-glosso-laryngeal. Case by Lawson Tait, *Med. Times & Gaz.*, 1870, p. 667. Refers to Lockhart Clarke's papers for anatomy of nerves concerned.

—— Laryngeal paralysis; cases; laryngotomy in some. Mackenzie, *Med. Times & Gaz.*, 1869, p. 356.

—— Laryngeal paralysis of cords, with abscess; tracheotomy; cure. Marcet, *Lancet*, ii., 24, Dec., 1868.

—— Of several cranial nerves, including those of larynx, etc. Jackson and Mackenzie, *Med. Times & Gaz.*, Jan. 8, 1870, p. 35.

—— Progressive labio-glosso-laryngeal palsy. Clymer, *The Med. Record*, vol. v., p. 339.

PHARYNX.—Extirpation of pharyngeal tumor. DUGAS, *Am. Jour. Med. Sci.*, July, 1853, p. 280.

—— Inhalation of CO_2 in granular pharyngitis, *Am. Jour. Med. Sci.*, April, 1859, p. 543.

—— Extraction from pharynx of a needle which had penetrated the neck. MURRAY, *Med. Times & Gaz.*, May 7, 1859.

—— Pharyngitis and stomatitis leucémique (*Virch. Arch.*, Feb. 25, 1868), *Gaz. hebd.*, 1868, 270.

—— Pharyngeal polyp at nine years. MARSH; *Med. Times & Gaz.*, Nov. 13, 1869, p. 585.

—— Pharyngeal erysipelas, making its way on the face through the lachrymal canal. GALLARD (*Gaz. des hôp.*, 1868, 47), *Schmidt's Jahrb.*, Jan., 1869, p. 35.

—— Pharyngeal erysipelas extending into nasal cavities, conjunctiva, face. RIGAL, *Gaz. des hôp.*, 20, 1869.

—— Pharyngitis. MARMISSE. Consecutive œdema of glottis; tracheotomy; double broncho-pleuro-pneumonia; recovery with partial aphonia. *Journal de Bord.*, 4 Sec. I., p. 399, Sept., 1870.

—— Syphilitic affections of. Bemerkungen zur Pathologie und Therapie der Pharyngealerkrankungen Syphilitischer. KOHN (*Wien. Med. Presse*, ix. 44, 46, 1868), *Schmidt's Jahrb.*, 1869, 141, 3, p. 299.

—— Adenoid vegetations in the pharyngo-nasal region. Ueber adenoide Vegetationen in der Rachennasenhöhle. MEYER, zu Kopenhagen (*Hospitals Tidende*, Nov. 4, ii., 1865); extensively reviewed in *Schmidt's Jahrb.*, 1869, 141, p. 325. Communicated in English to *Medico-Chirurgical Transactions, London*, vol. liii., 1870, p. 191. Illustrated.

—— Case of stricture. HAYDEN (*Path. So. Dublin*), *Dublin Jour.*, xlviii. (96), p. 660, Nov., 1869. A remarkable case, compressing larynx and folding the edges of the epiglottis together; illustrated.

PHYSIOLOGY.—Die Functionen des Schlund- und Kehlkopfes, etc. MERKEL, Leipzig, 1862.

—— On the function of the epiglottis. SCHIFF, *Moleschott's Untersuch.*, 1864, ix. 4, p. 321.

—— Observations on the physiology of the larynx. WYLLIE, *Edinb. Med. Jour.*, Sept., 1866.

—— On action of superior laryngeal nerve. BIDDER, *Gaz. Méd. Paris*, 1867, p. 27.

—— L'acte de la déglutition, son mécanisme. MOURA, Paris, 1867.

—— Recherches expérimentales sur les divers mécanismes d'occlusion du larynx. KRISHABER, *Gaz. Méd. Paris*, 1869, Nov. 6, p. 596.

—— On the functions of the trachea. LEVEN, *Gaz. des hôp.*, 1869, No. 137. *Allg. Med. Cent.-Ztg.*, 1870, No. 13, p. 148. *Lancet*, March 5, 1870, *Am. Jour. Med. Sci.*, July, 1870.

—— A case illustrating the physiology and pathology of the cervical portion of the sympathetic nerve. Abundant discharge from one nostril only. OGLE, *Med. Chir. Trans.*, vol. ii., 1867; *Am. Jour. Med. Sci.*, April, 1870, p. 477.

PHYSIOLOGY.—Ostéomes du nez, et des sinus de la face. Ostéomes de l'organe de l'olfacteur. GOUBERT, 1870, *Rev. Arch. Gén.*, 1870, 214.

SCALDS, of pharynx and epiglottis by boiling liquids. THIESSEN; urges tracheotomy, *Gaz. hebd.*, 1868, p. 447, *Gaz. Méd. Strasb.*, 1868, p. 80.

—— Of the larynx. BEVAN, *Dub. Quar. Jour. Med. Sci.*, Nov., 1866.

—— Of pharynx, etc., by hot liquids. CLARK's *Lectures on Surgical Diagnosis., &c.*, London, 1870, p. 229.

SMALL-POX.—Kehlkopf Affectionen mit tödtl. Ausgange bei anomaler Variola. BERNUTZ, *L'Union*, 1869, p. 153.

SMELL.—Diagnosis by. At a meeting of Chir. So. (*Brit. Med. Jour.*, March 4, 1871), the president alluded to the diagnosis of syphilitic and other diseases by the sense of smell. Thirty years ago Dr. Stokes, of Dublin, expressed the opinion that the nose might be able to detect the difference between pneumonia and bronchitis. *The Med. Times*, 1871, p. 318.

SNEEZING.—Convulsive sneezing, and its relationship with migraine, bronchial asthma, and hay fever. FERBER (*Arch. der Heilkunde*, 1867), *Am. Jour. Med. Sci.*, July, 1870, p. 245.

SORE-THROAT.—A treatise on malignant angina, or putrid and ulcerative sore-throat, etc. JOHNSTONE, Worcester, 1779.

—— Traité de l'angine laryngée œdémateuse. SESTIER, Paris, ii. 1852.

—— Angina pharyngea œdematosa in children. WERTHEIMER (*Journal der Kinderk.*, Bd. xxxii., *Med. Times & Gaz.*, Dec. 24), *Am. Jour. Med. Sci.*, April, 1860, p. 537.

—— Catarrhal, simulating onset of typhoid fever, *Gaz. hebd.*, 1868, p. 312.

—— Traité des angines. CH. LASÈGUE, Paris, 1868.

—— Die Migräne ist eine Angina, der akute Magencatarrh eine Neurose. Ueber d. Bedeutung d. Angina faucium, ihre Verbindung u. ihren Zusammendrang mit einer Reihe von Krankheiten. FERD. WYDLER, Aaran, 1870.

—— Ulcero-membranous angina. Da Costa. *Am. Jour. Med. Sci.*, July, 1870, p. 129.

—— Angine gangréneuse. GUÉMENT (Société Medico-Chirurgicale de Bordeaux, 1869). Reviewed in *Arch. Gén. de Méd.*, Sept., 1870, p. 364. A case under Barillier in a lad 13, occurring in hospital after a cold douche. Death. Autopsy.

SPASM AND LARYNGISMUS STRIDULUS.—Tendency to spasm of glottis, produced by asparagus. DE SALLE, *Am. Jour. Med. Sci.*, vol. ix. p. 216.

—— Laryngismus and its effects MARSHALL HALL, *Am. Jour. Med Sci.*, July, 1853, p. 55.

—— TROY, notice of, in *Am. Jour. Med. Sci.*, Oct. 1855, p. 455.

—— WARDELL, *Brit. Med. Jour.*, May, 1868.

—— Valerian in laryngismus stridulus. HILL, *Brit. Med. Jour.*, April 11, 1868.

—— Ergoten in laryngeal spasm. *Brit. Med. Jour.*, Sept. 5, 1868.

—— Zur Therapie des Asthma infantum. LÖSCHNER, *Allg. Med. C.-Ztg.*, 1868, 83, p. 709.

—— in children, its connection with eclampsia. HENOCH, *Am. Jour. Med. Sci.*, July, 1868, p. 269.

SPASM AND LARYNGISMUS STRIDULUS.—Spasm of glottis, removing tube after tracheotomy for croup. BARTHEZ, *Gaz. des hôp.*, 1869, 10; also, *ibid.* p. 39.

—— with diphtheria of the colon; combined with scarlatina. BETZ, *Memorabilien*, 1869, xiv. 8.

—— Two cases of laryngismus stridulus successfully treated by bromides internally, and iodine externally. VARICK, *Trans. Med. So. New Jersey*, 1868; *Am. Jour. Med. Sci.*, April, 1869, p. 495.

—— LÖSCHNER (*Baier. Intel. Blatt.* 40), *Practitioner*, Jan 1869, p. 56.

—— Chloride of bromium in. POLITZER (*Jahrb. f. Kind.*, iii. h. 4), *Boston Med. & Surg. Jour.*, Jan. 12. 1871, p. 20.

—— Clinical lecture on. JOHNSON, *Brit. Med. Jour.*, May 6, 1871, p. 469.

SYPHILIS.—Laryngotomy for syphilitic disease. AMERMAN, *Am. Jour. Med. Sci.*, Jan. 1857, p. 284.

—— Syphilitic affections of the larynx. VAN BUREN, *N. Y. Med. Times*, July 7, 1860.

—— Nouveau traité des maladies vénériennes. ROBERT, Paris, 1861.

—— Syphilitic ulcers on the walls of the naso-pharyngeal space. TÜRCK, *Allg. Wien. Med. Ztg.*, 1861. No 48.

—— Syphilitic affections of the larynx. BRIDDON, *N. Y. Med. Times*, Dec. 1862, p. 327.

—— Syphilitic laryngitis. HAMILTON, *Dub. Jour.*, xxiii., 1862.

—— Ueber Krank. einzelner Theile des Kehlkopfs, etc. LEWIN, *Virch. Arch.* 1862, xxiii. p. 587.

—— DAVIES, *Med. Times & Gaz.* 1862, May, 241.

—— Retrecissements syphilitiques de la trachée. BOECKEL, *Gaz. des hôp.*, 1864, 3.

—— Die Syphilit. Erkrankung des Kehlkopfes. TÜRCK, *Allg. Wien. Med. Ztg.*, 1864, viii. 43.

—— Eruptions du larynx survenant dans la période secondaire de la Syphilis. DANCE, 1864.

—— On Syphilis. Translation. LANCERAUX, *Syd. So. Ed.*, 1869.

—— Syphilitic stenosis of larynx, tracheotomy. HAGEL, *Union Méd. Gironde*, 1868, p. 93.

—— Syphilitic laryngitis; tracheotomy; mercury; cure. *Trib. Méd.*, 1868, p. 559.

—— Die Syphilis der Schleimhaut der Mund—Rachen—Nasen—und Kehlkopfhöhle. KOHN, Erlangen, 1866.

—— deep ulcer at base of arytenoid in a married woman infected by childbearing No primaries. MORGAN, *Med. Press & Circ.*, Oct. 14, 1868. *Ranking's Abst.*, 1869, p. 139.

—— Sulphurous acid spray in syphilitic ulcers of larynx. PURDON, *Bienn. Retrosp. Syd. So.*, 1867–8, p. 45.

—— of larynx and liver. WHIPHAM, *Trans. Path. So. London*, xxi. 1870, p. 218.

—— Tracheotomy in syphilitic affections. TRÉLAT, *France Médicale*, 1868, p. 739; 1869, p. 285. *Med. Times & Gaz.*, Dec. 19, 1868. *Gaz. hebd.*, 1869, Nos. 13, 17, 18, 19, 20. *Gaz. Méd.*, Paris, 1869, p. 172.

THROAT.—On diseases of the mucous membranes of the throat. WAGSTAFF. London, 1851

—— A treatise on diseases of the air-passages, etc. GREEN, 4th edit. N.Y., 1858.

—— A peculiar sore-throat. WHITNEY, *Am. Jour. Med. Sci.*, Oct., 1859, p. 485.

—— Sore-Throat and the laryngoscope. JAMES, London, 1861.

—— On Diseases of the Throat. DIXON, London, 1865.

—— On the Throat and Windpipe. GIBB, 2d edit., London, 1866.

—— On the Throat. YEARSLEY, 8th edit. London, 1867.

—— On some diseases of the Nose, Throat, etc. MOORE, London, 1867.

—— Suicidal and homicidal wounds of. TAYLOR, *Guy's Hospt. Rep.*, 1869, vol. xiv.

—— Morbid Throat and Consumption. ALISON, London, 1869.

THYMUS.—Observations on the Surgical Anatomy of the Head and Neck. ALLAN BURNS, 2d edit., Glasgow, 1824.

—— The anatomy of the thymus gland. COOPER, London, 1832.

—— Observations on the sudden death of children from enlargement of the thymus gland. MONTGOMERY, *Dub. Jour. Med. Sci.*, 1836, p. 429.

—— On the thymus gland; its morbid affections, and the diseases which arise from its abnormal enlargement. CHAS. A. LEE, *Am. Jour. Med. Sci.*, Jan. 1842, p. 135.

—— A Physiological Essay on the Thymus Gland. JOHN SIMON, London, 1845.

THYROID.—Aneurism of, cured by ligature of the two thyroid arteries (*Lond. Med. & Phys. Jour.*, Feb. 1833), *Am. Jour. Med. Sci.*, xxi. p. 535.

—— gland De l'hypertrophie de la glande thyroide des femmes enceintes. GUILLOT, *Arch. Gén.*, Nov. 1860, p. 513.

—— Functions of. *Gaz. hebd.*, 1867, p. 640.

—— Tumor of neck in connection with thyroid gland. Removal. Recovery. Structure of tumor thyroidal. Illustrated. POLAND, *Guy's Hospl. Rep.* 1871, p. 484.

TONSIL.—Extensive œdema supervening after removal. WILLIAMS, *Am. Jour. Med. Sci.*, July, 1853, p. 225.

—— On the treatment of enlarged tonsils at any period of life. W. J. SMITH, London, 1865.

—— Diseased tonsils and their removal without cutting. MACKENZIE, London, 1868

—— BROCA's new tonsillotome, figured in *Gaz. hebd.*, 1868, p. 540.

—— On the removal of enlarged tonsils without cutting, with 123 cases. A. RUPPANER, *Med. & Surg. Rep.*, Phil. 1869 Nov. 20, 27.

—— Concretions in tonsils. Fall von Mandelsteinen. TOBOLD, *Berlin. Klin. Woch.*, vi. 3, 1869, p. 31.

—— Des inconvénients qui résultent de l'hypertrophie des amygdales. BOYRON, *Santé Publique*, 1869, No. 8, p. 59.

—— Chancre of tonsil in nurse, from syphilitic infant. GONDOUIN, *Union*, 43, 1869.

—— Tonsillothlipsie. NAGEL, *Wien. Med. Woch.*, 1870, No. 7, p. 108. Slitting of the mucous membrane and evulsion by the finger.

TONSIL.—Strangulation of the tonsils. AULNOIT (*Gaz. hebd.* 1870, No 17), *Ranking's Abst.*, July, 1870. p. 174.

—— Abscess in tonsil punctured. Fatal hemorrhage. GREEN, *Brit. Med. Jour.*, Dec. 17, 1870, p. 651.

—— Cystic tonsil. PARRY, *The Med. Times*, June 1, 1871, p. 324.

—— Hemorrhage after excision, arrested by emesis. Cases. HOOD (*Lancet*, Oct. 29), *Ranking's Abst.*, Jan. 1871, p. 187.

—— Encephaloid tumor of tonsil. CHEEVER, *Boston City Hospl. Rep.*, 1870; *Am. Jour. Med. Sci.*, April, 1871, p. 515. Sailor, æt. 43. Excision by external section. Satisfactory result. Wound closed entirely in 31 days.

TRACHEA.—Complete division of, etc. Cure. *Am. Jour. Med. Sci.*, vii. p. 248.

—— Longitudinal rupture of. Suicide or homicide? *Am. Jour. Med. Sci.*, Jan. 1853, p. 263.

—— Gunshot wound of, and other injuries. MOSES, *Am. Jour. Med. Sci.*, Jan. 1857, p. 29.

—— displacement of, and its separation from larynx by the kick of a horse. BERGER (*Lancet*, 9, 6, 56), *Am. Jour. Med. Sci.*, Jan. 1857, p 254.

—— Rupture of, from a fall. ATLEE, *Am. Jour. Med. Sci.*, Jan. 1858, p. 120.

—— Aneurism of aorta pressing upon trachea and causing violent symptoms of asthma. DARRACH, *Am. Jour. Med. Sci.*, Jan 1860, p. 82.

—— Rupture of trachea during parturition (3 cases reported by MENIERE, *Arch. de Méd.*, 1829; 2 by DEPAUL, *Gaz. Méd.*, 1842; CLOQUET, *De l'influence des efforts sur les organes renfermés dans la cavité thoracique*, 1820; SOYRE, *Gaz. des hôp.*, 1864, p. 367). DEMARQUAY, *Pneumatologie Médicale*, Paris, 1866, p. 175

—— Malformation of. RAYMOND, *Gaz. Méd.*, Paris, 1867, p. 300.

—— Cases of injury to. LONG, *Liverpool Med. & Surg. Rep.* vol. 1, 1867, p. 8.

—— Rupture of trachea. *Med. Times & Gaz.*, vol. 13; Holmes' System of Surgery, vol. 2, p. 286. *Med. Chir. Rev.*, No. 75, p. 275.

—— Horizontal Durchtrennung der Luftröhre in 2. Knorpelringe bis zur hintern Knorpellosen Wand. Heilung. ROSENBAUM, *Wien. Med. Woch.*, xvii. 36.

—— Windpipe and consumption. GARRETT, London, 1868.

—— protection to trachea from hemorrhage during operations. Apparat, welcher die Anästhesirung bei Oberkieferresectionen ermöglicht. BELOW, *Allg. Med. Cent. Zeitg.* No. 13, 1870, p. 145. 3 illustrations.

—— displacement from external pressure. MACKENZIE (*Trans. Chir. So. London*), *Am. Jour. Med. Sci.*, April, 1870, p. 487.

—— Cancer of trachea and œsophagus with swelling of arytenoid cartilages. Autopsy. Interior of larynx healthy, cancerous mass at third ring of trachea posteriorly, perforating œsophagus, embedding right common carotid and internal jugular, right vagus, and involving right pleura. WOOD, *Brit. Med. Jour.*, 1871, p. 196.

—— Stricture from syphilitic ulceration. ERICHSEN, *Med. Times & Gaz.*, 1871, p. 394.

Trachea.—Syphilitic constriction of Trachea. Specimen exhibited to Path. So. Feb. 21, 1871. Mackenzie—deposits in liver. *Med. Times & Gaz.*, March 11, 1871, p 293.

Tumors.—Surgical observations on tumors. Warren, Boston, 1837.

—— Lectures on tumors. Paget, London, 1853.

—— Super-laryngeal encysted tumors; or encysted bursal tumors in front of the larynx. 10 cases. Hamilton, *N. Y. Med. Jour.*, Jan. 1870, p. 50.

—— Primitive cancer of Larynx, Fauvel; tracheotomy by Demarquay. Death from pneumonia at fourth day. Two other cases only said to be on record, and these reported by Louis and Trousseau. *Gaz. des hôp.*, March 19, 1870, No. 33. Another case is reported by Navratil in *Vienna Medical Presse*, 1868, 24 and 25. –See also Paget on tumors, edit. 1853, p. 428.

—— Encephaloid Tumor of rapid growth, above right clavicle, inducing cough, dyspnœa, and dysphagia. Bartlett, *Am. Jour. Med. Sci.*, April, 1871, p. 592.

Uvula.—Microscopic appearances of a relaxed uvula. Inman, *Med. Times & Gaz.*, 1852, July 31.

—— Amputation of, by double flap method. Maunder, *Lancet*, Aug. 22, 1868.

Whooping-Cough.—Cured in eight days by endermic use of morphia. Meyer (*Arch. Gén.*), *Am. Jour. Med. Sci.*, vol. v. p. 501.

—— Immediately arrested by use of belladonna and hydrocyanic acid as used by Dr. Kahleiss. Valk, *Am. Jour. Med. Sci.*, vol. vii. p. 417.

—— Prussic acid in. Atlee, *Am. Jour. Med. Sci.*, x. p. 128.

—— De l'emploi des cauterizations. Joubert, *Union Méd.*, 1851, No. 146.

—— Topical treatment. Eben Watson, *Am. Jour. Med. Sci.*, Oct. 1851, p. 490.

—— Chloroform in. Churchill, *Am. Jour. Med. Sci.*, Oct. 1853, p. 497.

—— Combined local and constitutional treatment. Pearce, *Am. Jour. Med. Sci.*, Oct. 1857, p. 519.

—— Krankheiten der Bronchien- und der Lungen-Parenchyms. Biermer, in Virchow's Handbuch der Speciellen Pathologie und Therapie. Erlangen, 1865.

—— Brown-Sequard on. *The Medical Record*, vol. i. p. 227.

—— Influence of expired air during. *Gaz. hebd.* 1867, p. 525; Pouchet, *Gaz. Med. Paris*, 1867, p. 513.

—— Vapors of tar, résinéone, gas, benzine, etc. Results of. *Gaz. Méd. Strasbourg*, 1867, p. 230.

—— Inhalations in. Steffen (*Jour. f. Kind.*, 1866, 1 & 2), *Gaz. Méd. Strasbourg*, 1867, p. 235.

—— Compressed air in (*Journ. f. Kinderk.*, 1867, Nos. 11 & 12), *Gaz. Méd. Strasbourg*, 1868, p. 118. Sandahl of Stockholm, *La Trib. Méd.*, 1868, p. 558.

—— Bromide of potassium in. De Beaufort, *Am. Jour. Med. Sci.*, April, 1868, p. 536.

—— Animalcules of. *Med News & Lib.*, 1868, p. 27.

Whooping-Cough.—Ergotine in. *Brit. Med. Jour.*, Sept. 5, 1868.

—— Valerian in. Hill, *Brit. Med. Jour.*, April 11, 1868.

—— Oppolzer on. *Memorabilien*, xiii., No. 7, p. 176.

—— Melon Syrup, containing codeia, used as a specific in Italy. *Journal für Kinderkr.*, 1868, 7 & 8.

—— Carbolate of lime in. Snow, *Medical Record*, 1869, Jan. 15.

—— hydrochlorate of quinine in. Binz, *Practitioner*, 1869, Nov. p. 304.

—— Œdema of glottis in. Tracheotomy. Death. Barthez, *Gaz. des hôp.*, 32, 1869.

—— Sulphuret of potash in. Mackelcan, *N. Y. Med. J.*, Jan. 1869, p. 444.

—— Discovery of the fungus of. Letzterich, *Virch. Arch.*, March, 1870.

—— Ioduret of silver in. Bartlett, *Am. Pract.*, Feb. 1870.

—— Vapor of ammonia in. Grantham, *Brit. Med. Jour.*, 1871, p. 323.

—— Ulceration of frænum linguæ in. Maccall (*Glasgow Med. Jour.*, Feb. 1871), *Am. Jour. Med. Sci.*, April, 1871, p. 564.

Wounds.—Occlusion from wound in suicidal attempt; re-establishment of canal in larynx; tracheotomy, etc. Liston (*Edinb. Med. Jour.*, Jan. 1828), *Am. Jour. Med. Sci.*, vol. ii. p. 214.

—— Danger of penetrating wounds of trachea and larynx. *Am. Jour. Med. Sci.*, April, 1855, p. 436.

—— Wound of larynx and other parts; ligation of carotid. Cole, *Am. Jour. Med. Sci.*, June, 1858, p. 213.

—— Verletzungen und Chirurgische Krankheiten der Halsgegend. Louis Stromeyer, Freiburg, 1865.

—— Plaie du larynx, ré-unie par suture, et guéri sans accidents. Mélanges de cliniques par A. Lejeal, Paris, 1868. *Arch. Gén.*, Jan. 1869.

—— Plaies du larynx, de la trachée et de l'œsophage. Horteloup, Paris, 1869.

—— Cicatricial atresia from suicidal wounds. Narbige Atresie des Larynx durch Selbstmordversuch (1864). Küchler, *Deutsche Klinik*, 1869, p. 169.

—— Plaie transversale du larynx par instrument tranchant; suture; guérison par première intention. Prestat, *Bul. Gén. de Thér.*, Sept. 15–30, 1869, p. 237. *Gaz. des hôp.*, 1869, 101, p. 399; 103, p. 405.

—— Wound and partial division of cricoid cartilage. Death on fourth day from pleurisy, from contiguity of pleura to burrowing abscess in areolar tissue behind trachea.—Five cases of wound through thyro-hyoid membrane. All recovered. One extended upwards and involved the epiglottis. Le Gros Clarke's *Lectures on Surgery*, London, 1870, pp. 225, 227. See notice of other cases, of suicide and attempted suicide, in same lecture.

—— Division of larynx and œsophagus (in an attempt at suicide) without wounding the jugulars or carotids. Alston, *Richmond and Louisville Med. Jour.*, Dec. 1871.

INDEX.

- Ablutions in ozæna, 267.
- Aborting coryza, methods of, 255.
- Abscess, nasal, 250.
  - from wounds of the pharynx, 209.
  - of the frontal sinuses, 326.
  - of the neck, 507.
    - œsophagus, 154.
    - pharynx, 148.
      - in phlegmonous sore throat, 82.
- Acid nitrate of mercury in the treatment of laryngeal growths, 424.
- Accidental choking as a cure of aphonia, 474.
  - wounds of the pharynx, 210.
- Accretions, calcareous, in the nasal fossæ, 305.
- Acute laryngitis, 333.
- Acuteness of smell, 291.
- Adenomas of the nostrils, 315.
  - of the palate, 137.
- Adhesions in enlarged tonsils, 132.
  - of the palate, 140.
- Ammonia, in whooping-cough, 485.
  - inhalations of muriate of, in coryza, 257.
  - nascent fumes of muriate of, 276.
- Amputation of the uvula, 145.
- Amygdalitis, 82.
- Analogy between diphtheria and scarlatina, 108.
- Anatomy, regional, of the larynx, 47.
- Anesthesia in laryngoscopy, 28.
  - in the operation of thyrotomy, 448.
- Aneurism of the aorta, a cause of aphonia, 466.
- Angina, 78.
  - maligna, 89.
- Anginose scarlatina, 109.
- Anosmia, 289.
- Anterior examination of the nasal passages, 75.
- Aorta, aneurism of the, 466.
- Appearance of the image of the larynx in the laryngoscopic mirror, 54.
- Aphonia, 461.
  - from aneurism of the aorta, 466.
- Apparatus, illuminating, 33, 34.
  - Tobold's illuminating, 31.
  - to increase the illumination of the pharyngeal cavity, 28.
- Artery forceps, torsion, 511.
- Artificial light, in examinations of the throat, 30.
  - use of, in laryngoscopy, 29.
  - openings into the larynx and trachea, 496.
- Aryteno-epiglottic folds, 48.
  - muscle, 56, 62.
- Arytenoid cartilages, 47.
  - muscle, 61.
- Arytenoidal commissure, 58.
  - fissure, 58.
- Asphyxia from abscess of the pharynx, 148.
  - growths in the larynx, 408.
- Atmosphere, warm and moist, in croup, 400.
- Auditory apparatus, affections of, in scarlatina, 107.
- Aural implications in syphilis, 115.
- Auscultation of the œsophagus, 217.
- Auto-infra-glottic laryngoscopy, 45.
- Auto-laryngoscopy, 11, 25, 449.
- Barking cough, 478.
- Bathing, 87.
- Bellocq's canula for tamponing the posterior nares, 250.
- Bibliography, 532.
- Bifid uvula, 147.
- Billroth, on excision of the œsophagus, 220.
- Blood-vessels of the larynx, 65.
- Blows on the head, a cause of anosmia, 290.
- Bougies for dilating the œsophagus, 219.
- Bromine inhalations in croup, 402.
- Bronchial septum, the, 457.
- Bronchocele, 515.
- Brush-holders, 386.
- Burns and scalds of the throat, 123.
- Bursa, the pharyngeal, 179, 181, 187.
- Bursal tumors in the thyro-hyoid region, 513.
- Calcareous accretions in the nasal fossæ, 305.
  - concretions in the tonsils, 125.
- Camphor by inhalation in coryza, 257.
- Cancerous tumors of the tonsils, 125.
- Canule for plugging the posterior nares, 250.
  - use after tracheotomy, 498.
- Carbonaceous sputa following the inhalation of smoke, 121.
- Carbonate of ammonia in croup, 403.
- Caries of the cervical vertebræ, 149.
- Cartilages, histology of the laryngeal, 65.
  - of Wrisberg, 48.
- Carotid, dysphonia following ligation of the, 466.
- Casts, in membranous sore throat, 94.
- Catarrh, nasal, 263.
- Catarrhal croup, 396.
- Catechu in elongated uvula, 146.

Catheterization of the air-passage in croup, 405.
    larynx and trachea, 505.
Caustic applications to laryngeal growths, 419.
    holders, laryngeal, 419.
Cephalo-pharyngeal muscle, 179.
Cerebral disease, anosmia from, 290.
Cerebral paresis from influenza, 263.
Chancres of the mouth and throat, 113.
Chloride of gold in chronic pharyngitis, 173.
    lime in ozæna, 274.
Choking sometimes a cure in aphonia, 474.
Chromic acid in enlarged tonsils, 132.
    the treatment of laryngeal growths, 425.
Chronic elongation of the uvula, 145.
    enlargement of the tonsils, 126.
    follicular pharyngitis, 156.
    inflammation of the trachea, 391.
    laryngitis, 347.
        following small-pox, 106.
    nasal catarrh, 263.
Cleft-palate, 141.
    appearance of glandular tissue at vault of pharynx in a case of, 185.
Clergyman's sore throat, 158.
Coin-catcher, œsophageal, 236.
Cold as a cause of disease of the throat, 4.
    in epistaxis, 248.
    in the head, 251.
    sponge-bath, 87.
Common sore throat, 79.
Compression in treatment of enlarged tonsils, 127.
Concretions in the tonsils, 125.
Congenital fistule of the œsophagus, 214.
    occlusion of the œsophagus, 212.
        posterior nares, 295.
    stricture of the œsophagus, 216.
    tumors of the larynx, 418.
Connective tissue of the neck, diffuse inflammation of the, 507.
Constriction of the œsophagus, 221.
    trachea, 393.
Consumption in relation to enlarged tonsils, 127.
    simulated by constriction of the trachea, 394.
    symptoms of, produced by elongation of the uvula, 169.
Control, voluntary, over tongue and throat, 8.
Contusions of the larynx and trachea, 495.
Cords, false vocal, 49.
    vocal, 49.
Coryza, 250.
    chronic, 263.
    from reflex irritation, 265.
    idiosyncratic, 258.
    syphilitic, 119.
Cough, ear, 481.
    spasmodic, 478.
Cough, whooping, 482.
Cretinism, 515.
Cricoid cartilage, 47.
Crico-thyroid muscle, 61.
Croup, 395.
    after tracheotomy, 406.
    differential diagnosis of, from abscess of the pharynx, 156.
Cryptogamic origin of diphtheria, 97.
    influenza, 262.
Cubebs in croup, 405.
    oleo-resin of, in ozæna, 272.
Cuneiform cartilages, 48.
Cynanches, 78.
Cystic tumors of the thyro-hyoid bursæ, 513.
    tonsils, 125.
Czermak, as an exponent of laryngoscopy, 11.
    his method of auto-laryngoscopy, 37.
Deafness in measles, 107.
Degenerations of the thymus gland, 531.
    thyroid gland, 518.
Deglutition in abscess of the pharynx, 153.
    chronic follicular pharyngitis, 165.
    diphtheria, 99.
    scarlatina, 109.
Demonstro-laryngoscopy, 40.
Deodorizing agents for use with nasal douche, 281.
Depression of the epiglottis, 25, 385.
Deviations of the septum of the nose, 301.
Diaphoresis in the treatment of coryza, 256.
Differentiation of diphtheria, from affections simulating it, 100.
Dilatation of the œsophagus, 222.
Dilator, for facilitating the entrance of the tracheotomy-tube, 503.
Distensible tissue of the nasal mucous membrane, 244.
Diseases of the throat, in general, 1.
Diverticulum of the œsophagus, 195.
    pharynx, 195.
Douche, the laryngeal, 387.
    nasal, 278.
Dysphonia, from ligation of the carotid, 466.
Ear-cough, 481.
Ear, disease of middle, from use of nasal douche, 289.
Écraseur, adaptation of, for removal of naso-pharyngeal tumors, 207.
    for removal of tonsils, 131.
        laryngeal tumors, 441.
Elastic membrane of the larynx, 48.
Electricity in anosmia, 290.
    aphonia, 471.
    glosso-pharyngeal paralysis, 225.
    goitre, 525.
    paralysis of the pharynx and œsophagus, 224.
    spasm of the œsophagus, 222.

Electricity in spasmodic cough, 480.
  suffocative laryngismus, 477.
Electrodes, laryngeal, 471.
Electrolysis in enlarged tonsils, 132.
  naso-pharyngeal tumors, 207.
Elephantiasis of the larynx. 390.
Elongation of the uvula, 25, 145.
  simulating consumption, 169.
Elsberg's nostril dilator, 75.
Emetics in croup, 402.
Emphysema from whooping-cough, 484.
Enchondroma of the palate, 140.
  pharynx, 194.
Enlarged tonsils, 24, 126.
Epiglottis, 47.
  appearance of the, in the laryngoscopic image, 51.
  -holders, 26.
  large, a cause of spasmodic cough, 479.
  management of the, in laryngoscopy, 25.
Epistaxis, 245.
  in measles, 106.
Epithelium, destruction of, in inflammations of mucous membranes, 3.
  of the laryngeal mucous membrane, 64.
Erysipelatous sore throat, 110.
Erythematous sore throat, 79.
Eustachian tube, appearance of pharyngeal orifice of, in a case of cleft palate, 186.
  pharyngeal orifice of the, 74.
Examination of the throat, 6.
  one's own larynx, 35.
  the laryngeal image, in detail, 50.
  nasal passages, anteriorly, 75.
  naso-pharyngeal region, 68.
  nostrils, 68.
  posterior nares, 68.
  through a wound in the larynx or trachea, 43.
Exanthemata, sore throats of the, 104.
Excision of the œsophagus, 220.
  tonsils, 128.
  uvula, 145.
Excrescences in the larynx following croup, 404.
  measles, 107.
  in syphilis, 116.
  on the uvula, 147.
Exhibition of a patient's larynx to others, 40.
Exophthalmic goitre, 515.
Exostoses of the frontal sinuses, 331.
  pharyngeal vertebræ, 194.
External manipulation of the larynx as a cure in aphonia, 474.
Extirpation of tumors in the neck, 510.
Extraction of foreign bodies from the larynx, 455.
  nostrils, 303.
  œsophagus, 234.
Exudation of diphtheria, 98.
  measles, 107.
  scarlatina, 108.
False croup, 396.
  vocal cords, 49.
Falsetto tones, 67.
Fancied bodies in the pharynx and œsophagus, 239.
Fatty tumor of the œsophagus, 228.
Fibrin, in secretions from diseased mucous membrane, 3.
Fibrous growths, thickened membrane of chronic coryza mistaken for, 263.
  tumor of the œsophagus, 228.
Filtrum ventriculi, 61.
Fistule of the larynx and trachea, 395.
  œsophagus, 214.
  œsophageal, 231.
  tracheo-œsophageal, 233.
Flap amputation of the uvula, 145.
Follicular pharyngitis, 156.
Forceps-holder for nitrate of silver, 422.
  laryngeal, 428.
  œsophageal, 235.
Forcible elevation of the epiglottis, 386.
Foreign bodies in the larynx removed under laryngoscopy, 455.
Foreign bodies in the nostrils, 301.
  œsophagus, 232.
  tonsils, 125.
Fovea centralis, 57.
Fractures of the larynx, 487.
  trachea, 493.
Frog-face, 196.
Frontal sinuses, affections of the, 325.
Fungus of whooping-cough, 483.
Garcia's observations in auto-laryngoscopy, 11.
Galvano-cautery, accidental wound of pharynx caused by, 211.
  laryngeal instruments for, 442.
  in enlarged tonsils, 132.
  nasal tumors, 313.
  naso-pharyngeal tumors, 207.
Gland, affections of the thymus, 529.
  thyroid, 514.
Glands of the larynx, 64.
Glandular enlargements in abscess of the pharynx, 153.
Glandular enlargements in scarlatina, 110.
  hypertrophy at vault of pharynx, 174
  tissue at vault of pharynx, as seen in a case of cleft-palate, 184.
  vegetations at vault of pharynx, 190.
Glosso epiglottic folds, 51.
  fossæ or sinuses, 52.

Glosso-epiglottic ligament, 51.
Glosso-pharyngeal paralysis, 225.
Glottis, 56.
        muscular forces producing changes in the form of the, 60.
Glycerine in ozæna, 275.
Goitre, 515.
Gravedo, 251.
Gross, on wounds of the œsophagus, 231.
        pharynx, 210.
Growths in the larynx, 404.
        suitable for removal with forceps, 433.
Hard-palate, division of the, in operations for the removal of naso pharyngeal tumors, 200.
Hay asthma: hay fever, 258.
Hearing, impairment of, in chronic follicular pharyngitis, 167.
Hemicrania, due to nasal calculi, 307.
Hemorrhage from excision of the tonsils, 130.
Herpetic eruption of membranous sore throat, 93.
Hilton's sac, 49, 55.
Histology of the larynx, 65.
History of œsophagotomy, 241.
Hot and cold food, as a cause of sore throat, 5.
Hygroma of the thyro-hyoid bursæ, 513.
Hypertrophy, glandular, at vault of pharynx, 174.
        of the thymus gland, 530.
        thyroid gland, 515.
        tonsils, 126.
Hypodermic injections in aphonia, 473.
Hypophosphites in diphtheria, 102.
Hysterical aphonia, 462.
Idiosyncratic coryza, 258.
        ozæna, 266.
Illuminating apparatus for laryngoscopy, 31.
        gas, vapors from, in whooping-cough, 485.
Impediments to laryngoscopic examination, 20.
Infantile coryza, 255.
Infants, syphilitic sore throat of, 119.
Infection of diphtheria, 97.
Infiltration of the sides of the vomer, 297.
Inflammation of the trachea, 390.
        septum narium, 296.
Infra-glottic laryngoscopy, 43.
Influenza, 259.
Inhaler, nasal, 258.
Inhalations in coryza, 257.
        croup, 401.
        spasmodic cough, 480.
        whooping cough, 485.
Inhalation of irritant substances as a cause of disease of the throat, 5.
Injections in epistaxis, 248.
        of quinine in idiosyncratic coryza, 259.
Initial disturbance, points of, in inflammations of the throat, 4.
Inoculation of diphtheria, 98.
Inspection of the throat, 7.
Instrumento-mania of laryngoscopists, 12.
Introduction of the laryngoscopic mirror, 16.
Iodide of potassium in goitre, 524.
Iodine inhalations in coryza, 257.
Irritability of the epiglottis, 385.
        fauces, 23.
Irritation, effect of, on mucous membrane, 2.
Johnson's method of auto-laryngoscopy, 38.
Knives, laryngeal, 436.
Laceration of the œsophagus, 229.
        trachea, 494.
Lactic acid in croup, 404.
Lamina intermedia of the thyroid cartilage, 66.
Laryngeal complications in small-pox, 105.
        image, examination of the, in detail, 50.
        implications in syphilis, 116.
        muscles, 61.
        œdema of chronic laryngitis, 345.
        ravages in phthisis, 362.
        sac, 49.
Laryngitis acute, 333.
        chronic, 347.
        œdematous, 357.
Laryngismus stridulus, 475.
Laryngo-pharyngeal fossa, sinus or sulcus, 48.
        affections of the, 505.
Laryngoscope, the, 11.
Laryngoscopic appearances in diphtheria, 99.
        small-pox, 105.
        mirror, 13.
        introduction of the, 16.
        position of the, 17.
Laryngoscopy, 10.
Laryngo-tracheotomy, 497.
Laryngotomy, 500.
Laryngotomy, sub-hyoidean, 419.
Larynx, affections of the, 333.
        artificial openings into the, 496.
        catheterization of the, 565.
        contusions of the, 495.
        examination of one's own, 35.
        fistulæ of the, 395.
        foreign bodies in the, 454.
        fractures of the, 487.
        growths in the, 406.
        œdema of the, 337.
        regional anatomy of the, 47.
        wounds of the, 486.
Lateral crico-arytenoid muscle, 61.
Lewin's method of generating nascent vapors of muriate of ammonia, 276.
Lime, vapor of, by inhalation in croup, 401.
Lingual sinuses, 52.
Liquor ammonia in croup, 405.
Local applications in ozæna, 273.
London paste in enlarged tonsils, 131.
Mackenzie's laryngeal electrodes, 471.
Maculæ flavæ, 57.

- Malformation of the œsophagus, 212.
- Malignant growths in the nasal fossæ, 315.
  - scarlatina, 109.
- Management of respiration in laryngoscopy, 27.
- Management of the tongue in laryngoscopy, 21.
- Manipulations within the larynx, 380.
- Measles, sore throat of, 106.
- Mechanical treatment of epistaxis, 248.
- Medicinal solutions applicable for use by the nasal douche, 283.
- Membrane, formed in diseases of the mucous membrane, 4.
- Membranous coryza, 252.
  - growths in the larynx, 414.
  - sore throat, 92.
- Metz' nostril dilators, 76.
- Microscopic appearances of adenoid vegetations at the vault of the pharynx, 191.
- Mirror, the laryngoscopic, 13.
- Moisture in diphtheria, 101.
- Molten nitrate of silver, 421.
- Mortality of pharyngeal abscess, 150.
- Mouth distenders, 142.
- Mucous membrane, normal secretion of, 2.
  - effect of irritation of, 2.
  - pellicle or membrane formed in diseases of, 4.
  - varying adherence of, in different portions of the larynx, 64.
- Mucous tubercle, 118.
- Mucus, formation of, 3.
- Mumps, 512.
- Muriate of ammonia in the nascent state, 276.
- Muscle aryteno epiglottic, 56, 62.
  - arytenoid, 61.
  - cephalo-pharyngeal, 179.
  - compressor sacculi laryngis, 56, 62.
  - crico-arytenoid, lateral, 61.
    - posterior, 60.
  - crico-thyroid, 61.
  - pharyngo-palatine, 133.
  - thyro-arytenoid, 62.
  - thyro-epiglottic, 62.
  - triceps-laryngea (Bataille), 63.
- Mycelium in a case of infiltration at the sides of the vomer, 290.
- Nasal abscess, 250.
  - calculi, 303.
  - catarrh, 263.
  - discharges, from presence of foreign bodies, 302.
  - douche, 278.
    - serious disease of middle ear from use of, 289.
  - inhaler, 258.
  - mucous membrane, 243.
    - thickening of, in chronic coryza, 264.
- Nasal passages, affections of the, 243.
  - calcareous accretions in the, 305.
  - syphilitic affections of the, 292.
  - tumors in the, 307.
  - polyps, 307.
- Nascent fumes of muriate of ammonia, 276.
- Naso-pharyngeal structures, examination of the, 68.
- Naso-pharyngeal tumors, 196.
- Nebulizers, laryngeal, 388.
- Neck, affections of the tissues of the, 507.
- Nerves of the larynx, 65.
- Nervous shock in burns and scalds of the throat, 123.
- Neudörfer, on infra-glottic laryngoscopy, 43.
- Neurilemmatous tumor in the nostril, 314.
- Nitrate of silver in chronic pharyngitis, 171.
  - croup, 403.
  - diphtheria, 101.
  - laryngeal growths, 424.
  - whooping-cough, 486.
- Nostril-dilators, 75.
- Nostrils, attention to condition of, in diphtheria, 102.
  - foreign bodies in the, 301.
  - occlusion of the, 294.
  - paralysis of the, 293.

- Occlusion of the nostrils, 294.
  - œsophagus, 212.
  - posterior nares, 295.
- Œdema of the larynx, 337.
  - differential diagnosis of, from abscess of the pharynx, 156.
  - in burns and scalds, 123.
  - erysipelas, 110.
  - small-pox, 104.
  - of the uvula, 146.
- Œsophageal bougies, 219.
  - forceps, 225.
  - horse-hair snare, 236.
- Œsophagitis, 212.
- Œsophagoscopy, 46.
- Œsophagotomy, 220, 240.
- Œsophagus, auscultation of the, 217.
  - congenital fistule of the, 214.
    - occlusion of the, 212.
  - constriction of the, 221.
  - dilatation of the, 216, 222.
  - division of the, 219.
  - excision of the, 220.
  - fancied bodies in the, 239.
  - foreign bodies in the, 232.
  - paralysis of the, 224.
  - rupture of the, 230.
  - spasm of the, 221.
  - special affections of the, 212.
  - stricture of the, 215.
  - tumors of the, 227.

Œsophagus, wounds of the, 229.
Ointments, applications of, to the nasal passages, 274.
Olfaction, 243.
Operations for goitre, 528.
Opium in nasal polyps, 311.
Origin of laryngeal growths, 412.
Osseous tumors of the nasal fossæ, 317.
  pharynx, 194.
Otorrhœa following scarlatina, 108.
Over-feeding, laryngitis from, 353.
Oxygen in croup, 405.
Ozæna, 265.
Palate, adhesions of the, to adjacent parts, 14.
  cleft of the, 141.
  paralysis of the, 144.
  special affections of the, 133.
  tumors of the, 137.
Papilloma of the pharynx, 195.
Paralytic aphonia, 465.
Paralysis, glosso-pharyngeal, 225.
  of diphtheria, 100.
  the nostrils, 293.
  œsophagus, 224.
  palate, 144.
  in syphilis, 114.
  pharynx, 224.
  vocal cords, 467.
Parasites in the œsophagus, 232.
Parotitis, 512.
Pertussis, 482.
Phagedenic sore throat, 95.
Pharyngeal bursa, 179, 181, 187.
  erysipelas, 111.
  tonsil, 187.
Pharyngitis, acute, 82.
  chronic, 156.
  sicca, 169.
Pharyngocele, 195.
Pharyngo-palatine muscles, 133.
Pharyngotomy, subhyoidean, 450.
Pharynx, abscess of the, 148.
  appearance of glandular tissue of, in a case of cleft-palate, 185.
  enchondroma of, 194.
  exostosis of vertebral wall of, 194.
  extension of inflammation of the, to the respiratory passages, 4.
  fancied bodies in the, 239.
  glandular hypertrophy at vault of, 174.
  osseous tumors of the, 194.
Pharynx, papilloma of the, 195.
  paralysis of the, 224.
  participation of the, in diseases of the digestive apparatus, 4.
  tumors of the, 193.
  wounds of the, 209.
Phlegmonous sore throat, 82.
Phonation, physiology of, 463.
Phthisis, laryngeal growths in, 411
  the chronic laryngitis of, 355.
Physiological movements made available in laryngoscopic manipulations, 59.
Piltz, the, of whooping-cough, 483.
Platinum bulbs for applications of caustics, 420.
Pneumatocele, 395.
Polyps of the nostrils, 307.
  œsophagus, 227.
Position of the laryngoscopic mirror, 17.
Posterior crico-arytenoid muscle, 60.
  nares, congenital occlusion of the, 25.
  examination of the, 68.
Powder insufflators, laryngeal, 289.
Powders by insufflation in ozæna, 215.
Pregnancy, goitre of, 519.
Probe, roughened for nitrate of silver, 422.
Processus vocalis, 57.
Pseudomembranous croup, 396.
Pseudo-plasm in membranous sore throat, 94.
Purulent croup, 396.
Pyramidal sinuses, 48.
Pyriform sinuses, 48.
Quadrangular membrane of the larynx, 48.
Quinine, hydrochlorate of, in whooping-cough, 485.
  injection of, in coryza, 259.
Quinsy, 82.

Recipro-laryngoscopy, 40.
Reflex irritation productive of coryza, 265.
Regional anatomy of the larynx, 47.
Relative relations of the larynx and its image in the laryngoscopic mirror, 19.
Removal of the entire larynx, 450.
  foreign bodies from the œsophagus, 235.
  nasal polyps, 311.
Respiration in abscess of the pharynx, 153.
  scarlatina, 109.
  management of the, in laryngoscopy, 27.
Retro-pharyngeal abscess, 148.
  -œsophageal abscess, 154.
Rhinitis, 251.
Rhinoliths, 305.
  from foreign bodies, 303.
Rhinorrhœa, 251.
Rhinoscopic image, 251.
Rhinoscopy, 68.
Rima glottidis, 56.
Rinsing, fluids for, with nasal douche, 280.
Rumination, 195, 216, 222.
Rupture of the œsophagus, 230.
  swellings in œdema of the larynx, 344.
  trachea, 494.
Salivation in small-pox, 105.
Santorini, cartilages of, 47.

Scalds and burns of the throat, 123.
Scarification in œdema of the larynx, 343.
Scarlatina, the sore throat of, 107.
Scissors, laryngeal, 438.
use of, in removal of laryngeal growths, 435.
Scrofulous ozæna, 268.
Searching for foreign bodies in the air-passages, 460.
Secretions of coryza, 253.
the normal, of mucous membrane, 2.
Semeleder, on auto-infra-glottic laryngoscopy, 45.
Semeleder, on œsophagoscopy, 46.
Sesamoid cartilages, 47.
Septum, bronchial, 457.
narium, deviations of the, 301.
inflammation of the, 296.
tumors of the, 300.
Sinuses, affections of the pharyngo-pharyngeal, 505.
Small-pox, the sore throat of, 104.
Smell, acuteness of, 291.
loss of, 289.
Smyly's method of demonstrative laryngoscopy, 43.
Snares for removal of laryngeal growths, 439.
œsophageal, 236.
Soft palate, division of, in operations for removal of naso-pharyngeal tumors, 199.
Sore throat, 78.
from burns and scalds, 123.
of erysipelas, 110.
of measles, 106.
scarlatina, 107.
small-pox, 104.
syphilis, 113.
the exanthemata, 104.
Spasm of the glottis in croup, 397.
œsophagus, 221.
trachea, 477.
Spasmodic cough, 473.
croup, 396.
Speech, in glandular hypertrophy at vault of pharynx, 174.
Sponge holders, laryngeal, 386, 421.
probang, use of, in croup, 403.
Sprays, use of, in chronic pharyngitis, 173.
scarlatina, 110.
syphilitic sore throat, 119.
Spray-producers, 388.
Stenosis of the larynx from burns and scalds, 124.
Stimulation in croup, 403.
Stricture of the œsophagus, 215.
from burns and scalds, 124.
following phlegmonous sore throat, 82.
Structures subjected to rhinoscopic inspection. 71
Strychnia, use of in aphonia, 473.
Subcutaneous fistule of larynx and trachea, 395.
Sub-glottic œdema of the larynx, 342.
Sub-hyoidean laryngotomy, 419, 497.
Submucous infiltration at sides of vomer, 297.
Suffocative laryngismus, 475.
Suicidal wounds of the pharynx, 210.
Sulphur in diphtheria, 101.
Sulphuric ether in croup, 404.
Sunstroke, paralysis of pharynx following, 224.
Supra-thyroid laryngotomy, 450.
Syphilis, chronic laryngitis of, 367.
laryngeal growths in, 411.
simulating epithelioma, 117.
the state of the thymus in, 532.
Syphilitic affections of the nasal passages, 292.
laryngitis, 116.
ozæna, 270.
sore throat, 113.
in infants, 119.
warts in the larynx, 116.
Syphon nasal douche, 287.
Syringe, laryngeal, 387.
Systemic poisoning of diphtheria, 99.
Tampon for the posterior nares, 250.
Tamponing in epistaxis, 249.
the posterior nasal fossa in operations in this region, 323.
Tannin, in the treatment of nasal polyps, 311.
Throat, diseases of the, in general, 1.
examination of the, 6.
Thudichum's nasal douche, 279.
nostril dilators, 76.
Thymitis, 529.
Thymus gland, affections of the, 529.
Thyroid cartilage, lamina intermedia of the, 66.
gland, affections of the, 514.
Thyro-arytenoid muscle, 62.
Thyro-epiglottic muscle, 62.
Thyro-pharyngo-palatine muscle, 134.
Thyrotomy, 445, 497.
Tobold's illuminating apparatus for laryngoscopy, 31, 35.
Tobold's perforated canule, and mirror for infra-glottic laryngoscopy, 44.
Tolerance of growth in the larynx, 418.
of manipulations within the larynx, 385.
Tongue-depressors, 7.
Tonsil, the pharyngeal, 187.
Tonsillitis, 82.
maligna, 82.
Tonsillotomes, 129.
Tonsils, chronic hypertrophy of the, 126.
special affections of the, 125.
the, in syphilis, 114.
Trachea, affections of the, 333.
artificial openings into the, 496.

Trachea, catheterization of the, 505.
    constriction of the, 398.
    contusions of the, 495.
    fistule of the, 395.
    foreign bodies in the, 454.
    fractures of the, 493.
    inflammation of the, 390.
    laceration of the, 494.
    local applications to the, 392.
    rupture of the, 494.
    spasm of the, 477.
    tumors of the, 452.
    wounds of the, 486.
Tracheal implications in syphilis, 116.
Tracheitis, treatment of chronic, 392.
Tracheo-œsophageal fistule, 233.
Tracheoscopy, 43.
Tracheotome, 504.
Tracheotomy, 500.
    in croup, 403.
        diphtheria, 103.
        laryngeal growths, 449.
        œdema of the larynx, 344.
    tubes, 498.
Transit of foreign bodies after having been swallowed, 238.
Traumatic fistule of the larynx and trachea, 395.
Treatment of aphonia, 470.
    chronic laryngitis, 372.
    croup, 400.
    foreign bodies in the air passage, 459.
    growths in the larynx, 417.
Tubage of the larynx and trachea, 505.
Tuberculous degeneration beginning in the lingual sinuses, 52.
Tuberculous degeneration beginning in the posterior wall of the larynx, 55.
Tuberculous laryngitis, 384.
    sore-throat, 160.
Tumors, bursal, of thyro-hyoid region, 513.
    cancerous, of the tonsils, 125.
    cystic, of the tonsils, 125.
    naso-pharyngeal, 196.
    of the frontal sinuses, 327.
        larynx, 413.
        neck, 509.
        nasal passages, 307.
            septum, 300.
        œsophagus, 227.
Tumors of the palate, 137.
        pharynx, 193.
        trachea, 452.
Türck, as an exponent of laryngoscopy, 11.
Turbinated bones, mucous membrane over, 243.
Ulcerated sore-throat, 89.
Ulceration of the trachea, 393.
Ulcerative ravages in syphilis, 115.
Unilateral aphonia, 465.
Upper maxillary bone, removal of, in operations on naso-pharyngeal tumors, 200.
Use of the nasal douche, 282.
Uvula, special affections of the, 145.
Uvulatome, 145.
Valleculæ, 52.
Vapors of lime in croup, 401.
    in ozæna, 275.
Vault of pharynx, glandular hypertrophy at, 174.
Vegetations, glandular, at vault of pharynx, 190.
Veins of the larynx, 65.
Ventricles of the larynx, 49.
Ventricular bands, 49.
Verneuil's case of naso-pharyngeal polyp, 201.
Vocal cords, 49.
        their appearance in the laryngoscopic image, 56.
Vocal cords, duplicatures of the elastic membranes of the larynx, 67.
Vocal cords, histology of the, 67.
    muscle, the, 63.
    processes, 57.
Voice, after croup, 406.
    factors of the, 462.
    in abscess of the pharynx, 153.
    in chronic follicular pharyngitis, 164.
Vomer, submucous infiltration at the sides of the, 297.
Warmth and moisture in the treatment of croup, 400.
Water-bag, in epistaxis, 248.
Whooping cough, 482.
Wire snares, 439.
Wintrich's method of indirect examination of the condition of the nasal passages, by percussion, 77.
Wounds of the larynx and trachea, 486.
        œsophagus, 229.
        pharynx, 209.
Wrisberg, cartilages of, 54, 60.

FINIS.

R46 Cohen, J.da S.S. 11689
C67 Diseases of the throat
1872

NAME	DATE DUE